EZ-ZONE® RMA (Access) Module

User's Guide

RMA Module

TOTAL CUSTOMER SATISFACTION
3 Year Warranty

ISO 9001
Registered Company
Winona, Minnesota USA

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Made in the U.S.A.

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Safety Information

We use note, caution and warning symbols throughout this book to draw your attention to important operational and safety information.

A "NOTE" marks a short message to alert you to an important detail.

A "CAUTION" safety alert appears with information that is important for protecting your equipment and performance. Be especially careful to read and follow all cautions that apply to your application.

A "WARNING" safety alert appears with information that is important for protecting you, others and equipment from damage. Pay very close attention to all warnings that apply to your application.

The safety alert symbol, ⚠ (an exclamation point in a triangle) precedes a general CAUTION or WARNING statement.

The electrical hazard symbol, ⚠ (a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement. Further explanations follow:

Symbol	Explanation
	CAUTION – Warning or Hazard that needs further explanation than label on unit can provide. Consult User's Guide for further information.
	ESD Sensitive product, use proper grounding and handling techniques when installing or servicing product.
	Unit protected by double/reinforced insulation for shock hazard prevention.
	Do not throw in trash, use proper recycling techniques or consult manufacturer for proper disposal.
	Enclosure made of Polycarbonate material. Use proper recycling techniques or consult manufacturer for proper disposal.
	Unit can be powered with either alternating current (ac) voltage or direct current (dc) voltage.
	Unit is a Listed device per Underwriters Laboratories®. It has been evaluated to United States and Canadian requirements for Process Control Equipment. UL 61010 and CSA C22.2 No. 61010. File E185611 QUYX, QUYX7. See: www.ul.com
	Unit is a Listed device per Underwriters Laboratories®. It has been evaluated to United States and Canadian requirements for Hazardous Locations Class 1 Division II Groups A, B, C and D. ANSI/ISA 12.12.01-2007. File E184390 QUZW, QUZW7. See: www.ul.com
	Unit is compliant with European Union directives. See Declaration of Conformity for further details on Directives and Standards used for Compliance.
	Unit has been reviewed and approved by Factory Mutual as a Temperature Limit Device per FM Class 3545 standard. See: www.fmglobal.com
	Unit has been reviewed and approved by CSA International for use as Temperature Indicating-Regulating Equipment per CSA C22.2 No. 24. See: www.csa-international.org
	Unit has been reviewed and approved by ODVA for compliance with DeviceNet communications protocol. See: www.odva.org
	Unit has been reviewed and approved by ODVA for compliance with Ethernet/IP communications protocol. See: www.odva.org

Warranty

The EZ-ZONE® RMA (Access) module is manufactured by ISO 9001-registered processes and is backed by a three-year warranty to the first purchaser for use, providing that the units have not been misapplied. Since Watlow has no control over their use, and sometimes misuse, we cannot guarantee against failure. Watlows' obligations hereunder, at Watlows' option, are limited to replacement, repair or refund of purchase price, and parts which upon examination prove to be defective within the warranty period specified. This warranty does not apply to damage resulting from transportation, alteration, misuse or abuse. The purchaser must use Watlow parts to maintain all listed ratings.

Technical Assistance

If you encounter a problem with your Watlow controller, review your configuration information to verify that your selections are consistent with your application: inputs, outputs, alarms, limits, etc. If the problem persists, you can get technical assistance from your local Watlow representative (see back cover), by e-mailing your questions to wintechsupport@watlow.com or by dialing +1 (507) 494-5656 between 7 a.m. and 5 p.m., Central Standard Time (CST). Ask for for an Applications Engineer. Please have the following information available when calling:

- Complete model number
- All configuration information
- User's Guide
- Factory Page

Return Material Authorization (RMA)

1. Call Watlow Customer Service, (507) 454-5300, for a Return Material Authorization (RMA) number before returning any item for repair. If you do not know why the product failed, contact an Application Engineer or Product Manager. All RMA's require:
   - Ship-to address
   - Bill-to address
   - Contact name
   - Phone number
   - Method of return shipment

- Your P.O. number
- Detailed description of the problem
- Any special instructions
- Name and phone number of person returning the product.

2. Prior approval and an RMA number from the Customer Service Department is required when returning any product for credit, repair or evaluation. Make sure the RMA number is on the outside of the carton and on all paperwork returned. Ship on a Freight Prepaid basis.
3. After we receive your return, we will examine it and try to verify the reason for returning it.
4. In cases of manufacturing defect, we will enter a repair order, replacement order or issue credit for material returned. In cases of customer mis-use, we will provide repair costs and request a purchase order to proceed with the repair work.
5. To return products that are not defective, goods must be in new condition, in the original boxes and they must be returned within 120 days of receipt. A 20 percent restocking charge is applied for all returned stock controls and accessories.
6. If the unit cannot be repaired, you will receive a letter of explanation. and be given the option to have the unit returned to you at your expense or to have us scrap the unit.
7. Watlow reserves the right to charge for no trouble found (NTF) returns.

EZ-ZONE RM is covered by U.S. Patent No. 6,005,577 and Patents Pending

TC Table of Contents

TC Table of Contents (cont.)

1 Chapter 1: Overview

The EZ-ZONE® Rail Mount Access module (RMA) takes the pain out of adding field bus protocols, data logging and more to your RM system architecture.

It just got a whole lot easier to solve the thermal requirements of your system. The RMA module is provided in a space-saving, rail-mount package and is highly scalable where you only pay for what you need. For those applications that require the ability to configure/monitor the control over a network this module will meet the need. Communications protocols available as options with this module include EtherNet/IP™, DeviceNet™, Modbus® RTU/TCP and Profibus DP. Using your browser with an open connection to the internet, click on the link below and browse Watlow's web site to find other complimentary RM products and associated documentation.
http://www.watlow.com/index.cfm

Standard Features and Benefits

Communication Capabilities

- Provides a wide range of protocol choices including Modbus® RTU, EtherNet/IP™, Modbus® TCP, DeviceNet™ and Profibus DP
- Serves as a configuration station
- Provides communication capabilities between the other modules and the PC or PLC
- Stores corresponding module parameter settings for easy auto-configuration of other additional modules or replacement modules
- Serves as a configuration station, which programs initial module setup or automatic programming of modules if swapping out after initial installation
- Provides a USB port for uploading and downloading configuration or datalog files directly to a PC
- Saves time and increases reliability of parameter setting

On-board data logging memory

- Ensures vital data is retained
- Downloads data files from the controller when-needed eliminating the need for a separate chart recorder

Off-the-Shelf Designed System Solution

- Improves system reliability with a factory integrated solution that minimizes inter-module connections and potential problems at screw termination points.
- Reduces installation cost
- Eliminates compatibility headaches often encountered with using many different components and brands

Memory for Saving and Restoring User-Defined Parameter Default Settings

- Allows customers to save and restore their own defined defaults for machine parameter settings
- Reduces service calls and downtime due to inadvertent end user parameter adjustments

System Integration is Made EZ with Unmatched Flexibility

- Comes with a wide range of communication options such as Ethernet which makes connecting to PLC's and touchpanel products a snap
- Provides plug and play capabilities with basic Remote User Interface (RUI's), see EZK accessory listings
- Free standard bus communications port and free PC software (EZ-ZONE Configurator)

Modules Allow for Greater Design Flexibility

- The RM System allows for 17 total modules including an Access module)
- Saves money because you do not pay for any more than you need and don't settle for any less functionality than you need

Split-Rail Control (SRC)

- Allows modules to be mounted together or mounted remotely from one another
- Shares control operation via Synergistic Module Control (SMC) capability
- Allows individual modules to be mounted closer to the physical input and output devices to which they are wired
- Improves system reliability and lowers wiring costs

Agency Certifications: UL® listed, CE, RoHS, W.E.E.E. SEMI F47-0200, Class 1 Div. 2 Rating on Selected Models

- Assures prompt product acceptance
- Reduces panel builder's documentation and agency costs

Removable Connectors

- Assures reliable wiring and reduces service calls
- Simplifies installation
- Provides a terminal option for accepting ring lug connection

Three-Year Warranty

- Demonstrates Watlow's reliability and product support

A Conceptual View of the RM System

The flexibility of the RM's software and hardware allows a large range of configurations. Acquiring a better understanding of the controllers overall functionality and capabilities while at the same time planning out how the controller can be used will deliver maximum effectiveness in your application.

The RM system at a high level can have a total of 17 modules installed, only one of which can be an RMA module and the others (16 maximum) can be any combination of available RM modules. Each installed RM module must have a unique Standard Bus address (factory default is 1) ranging from 1-9, A-F, H (10 -16). The Access module will be delivered with a default Standard Bus address of 17 (J). If not using the default zone address the user will need to define each zone address via the button on the face of each module.

The RMA can be considered an accessory RM module in that by itself it has no PID control loops. However, used in conjunction with an RM Controller (RMC) or RM High Density (RMH) module the RME provides increased I/O capabilities. Outputs of the RME can be used to drive output loads of various kinds. For instance, an RME module could be placed in a remote location (up to 200 feet away) from a PID controller such as an RMC or RMH to drive a heater.

Some of the user selectable ordering options are listed below:

1. Class 2 or SELV (Saftey Extra Low Voltage) equivalent Power Supplies:
   - 90-264 Vac to 24Vdc @ 31 watts
   - 90-264 Vac to 24Vdc @ 60 watts
   - 90-264 Vac to 24Vdc @ 91 watts
2. The RMA Module can provide:
   - Multiple field bus protocols
   - Data logging capabilities (up to 200 data points)
   - Real Time Clock with Battery Backup
   - Automatically (upon power restoration) re-enable a profile to run after a power loss
   - Auto-Configuration Backup

Note:

Zones can communicate with one another over the backplane (local and split rail). Once the system is configured and running changing zone addresses without careful deliberation may cause disruption in operation.

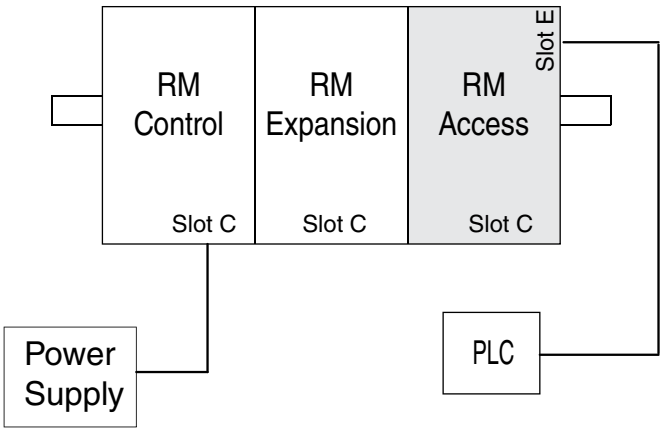
A Conceptual View of RM Hardware Configurations

Due to the scalability and flexibility in the system components a user has several options available in the way that the hardware can be connected. Listed below are a few examples.

RM System Connected to a Programmable Logic Controller (PLC) on a DIN Rail

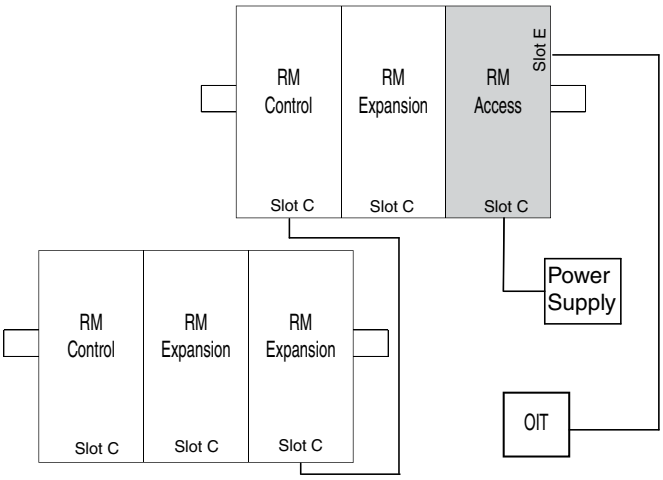
In this configuration the PLC can be connected to the RM system via the Access module using one or more available protocols:

1. EtherNet/IP and or Modbus TCP
2. DeviceNet
3. Modbus RTU
4. Profibus DP



RM System Connected to a Split Rail with an Operator Interface Terminal (OIT)

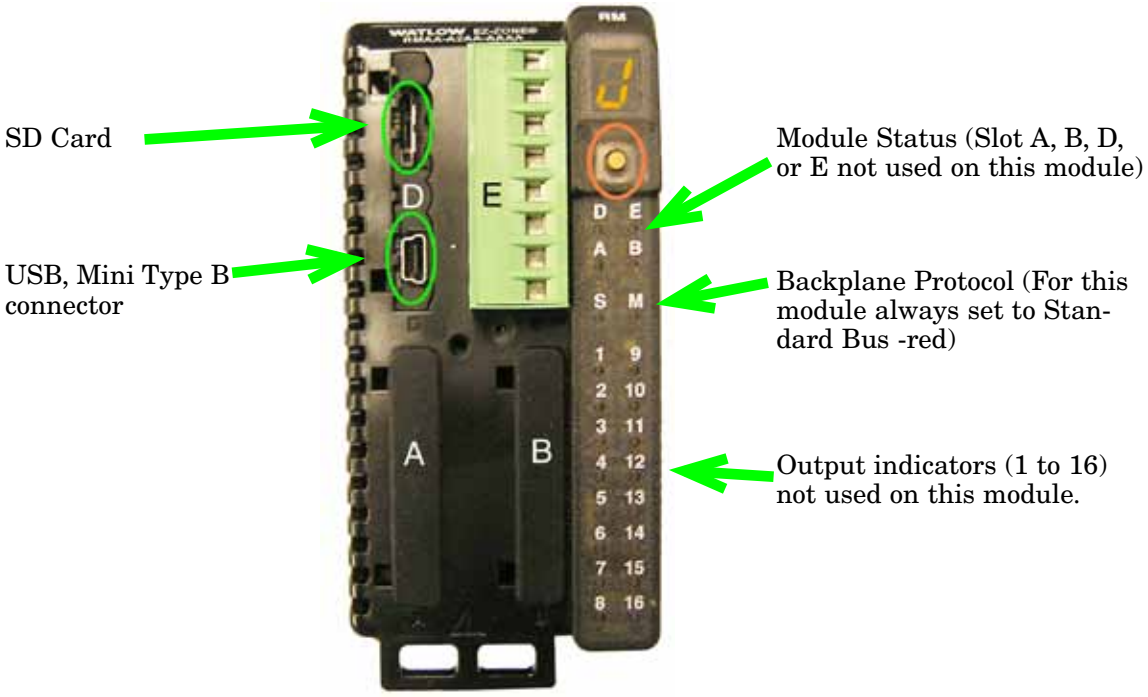
In this configuration both the Inter-module Bus (backplane communications) and Standard Bus are connected between rails to allow for remote capabilities. It is recommended that the split rail connection not exceed 200 feet. In this configuration the OIT can communicate with all modules (maximum 16 modules any combination with one Access module).

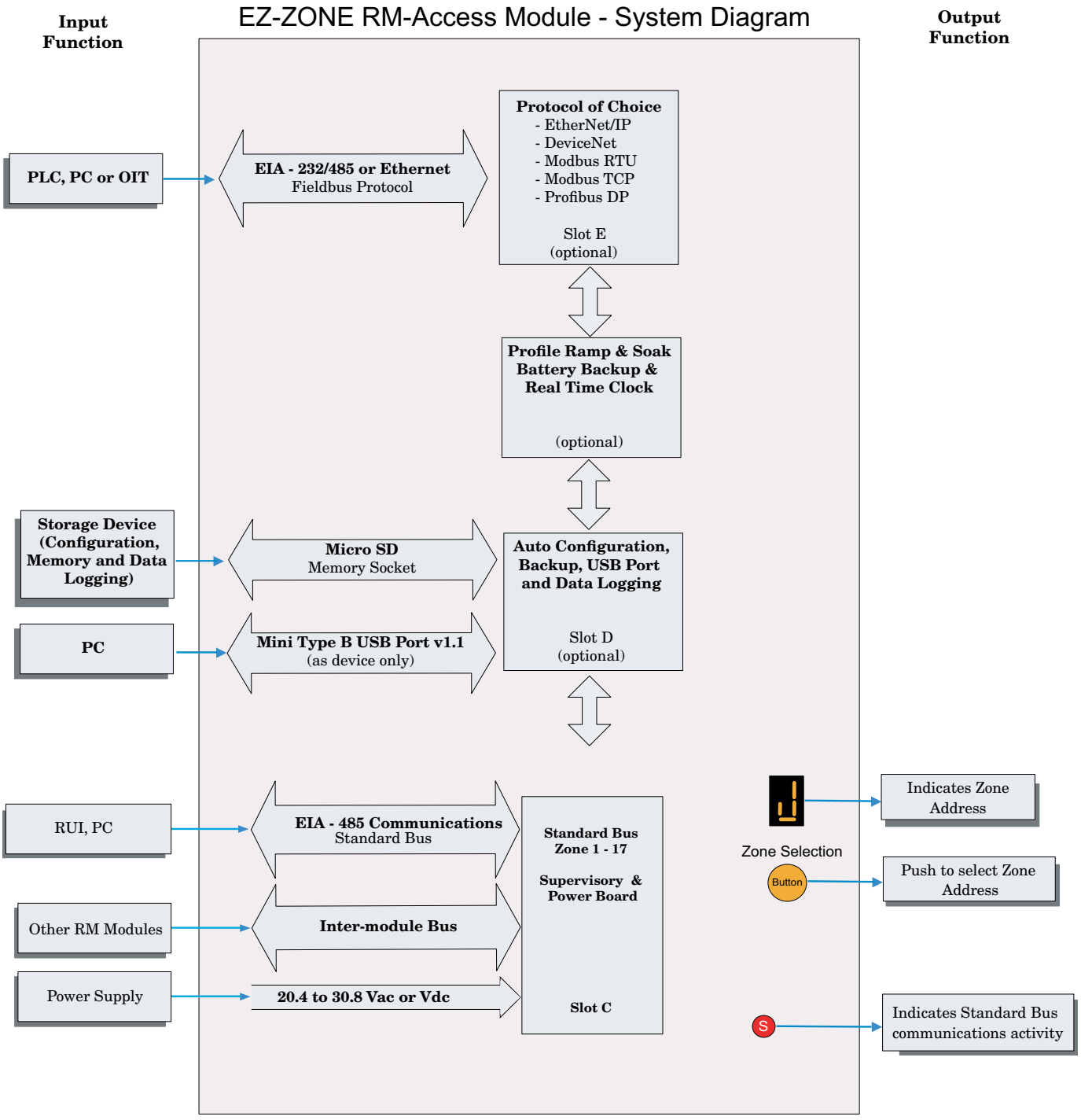


Module Orientation

The picture below reflects a front view of an RMA module. Like all RM modules, there are four slots that appear on the face (slot A, B, D, and E) of the module and one on the bottom (slot C) not shown. For this particular module only slots D and E can be used. On the face of the module there is a button (orange circle) under the Zone address [J] that when pushed and held has the following function:

1. Push and hold for ~ 2 seconds to change the Zone address. Valid addresses range from 1 -17 ([1] - [9], [A] is 10, [b] is 11, [C] is 12, [d] is 13, [E] is 14, [F] is 15, and [h] is 16). The Access module is shipped (default factory address) at address [J] or 17



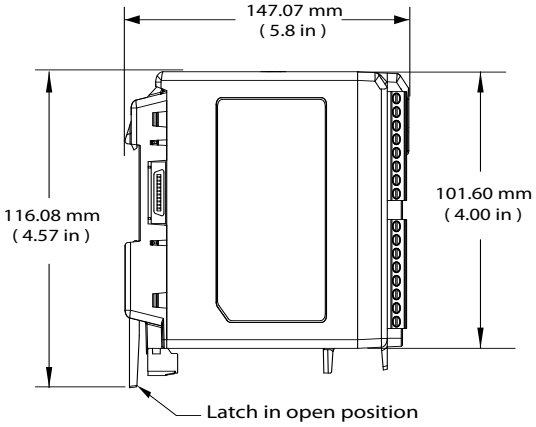

Input Function
EZ-ZONE RM-Access Module - System Diagram
Output Function
PLC, PC or OIT
EIA - 232/485 or Ethernet
Fieldbus Protocol
Protocol of Choice
- EtherNet/IP
- DeviceNet
- Modbus RTU
- Modbus TCP
- Profibus DP
Slot E
(optional)
Profile Ramp & Soak
Battery Backup &
Real Time Clock
(optional)
Storage Device (Configuration, Memory and Data Logging)
Micro SD
Memory Socket
Auto Configuration, Backup, USB Port and Data Logging
Slot D
(optional)
PC
Mini Type B USB Port v1.1
(as device only)
RUI, PC
EIA - 485 Communications
Standard Bus
Standard Bus
Zone 1 - 17
Supervisory &
Power Board
Slot C
Other RM Modules
Inter-module Bus
Power Supply
20.4 to 30.8 Vac or Vdc
Zone Selection
Button
Indicates Zone Address
Push to select Zone Address
S
Indicates Standard Bus communications activity

2 Chapter 2: Install and Wire

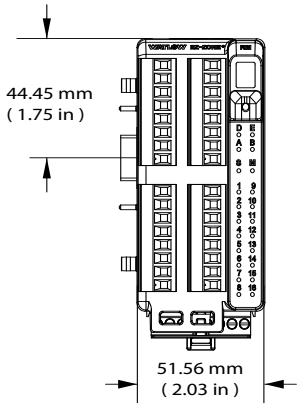
Dimensions

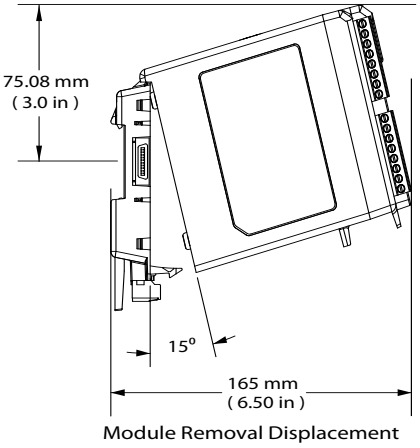
As can be seen below the dimensions of the RM system will change slightly based on the type of connector used.

Module Removal Clearance



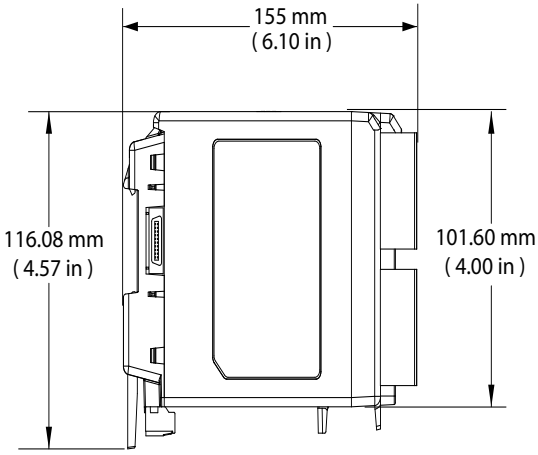
Standard Connectors



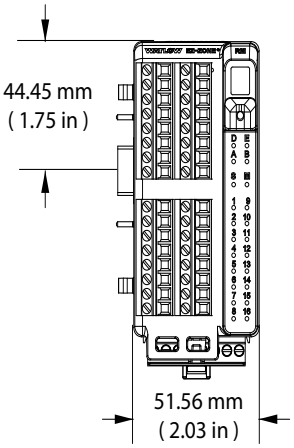


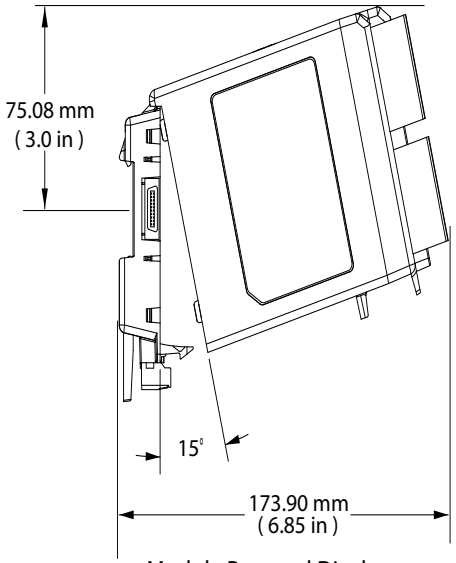
Module Removal Displacement

Module Removal Clearance



Straight Connectors

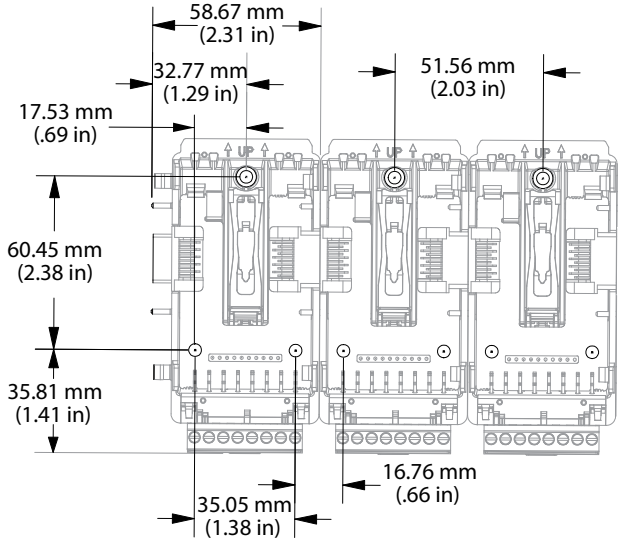




Module Removal Displacement

Dimensions

Chassis Mount Front View (Module Removed) - Screw Connection Pattern

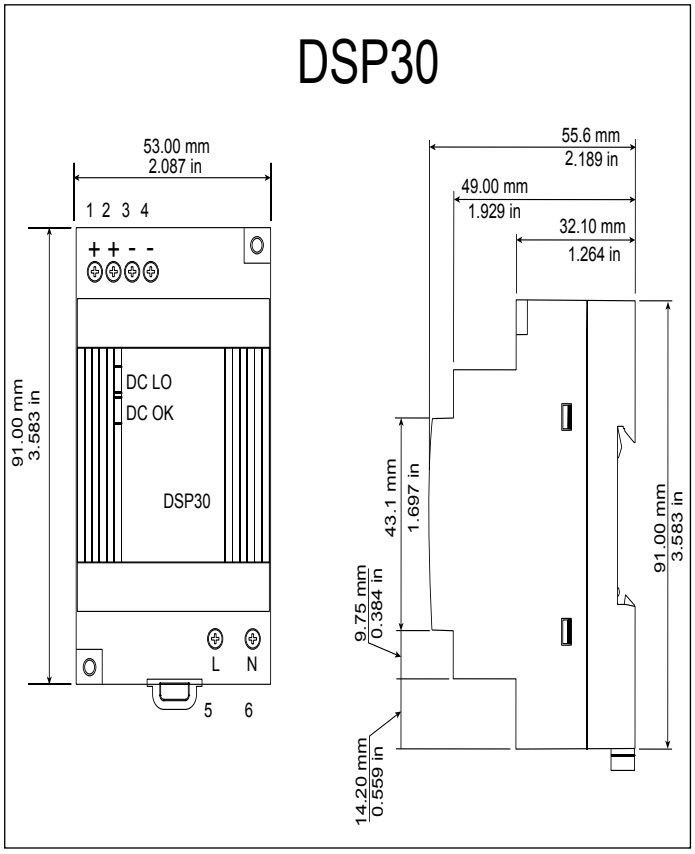


The view above is representative of the modular backplane without the module.

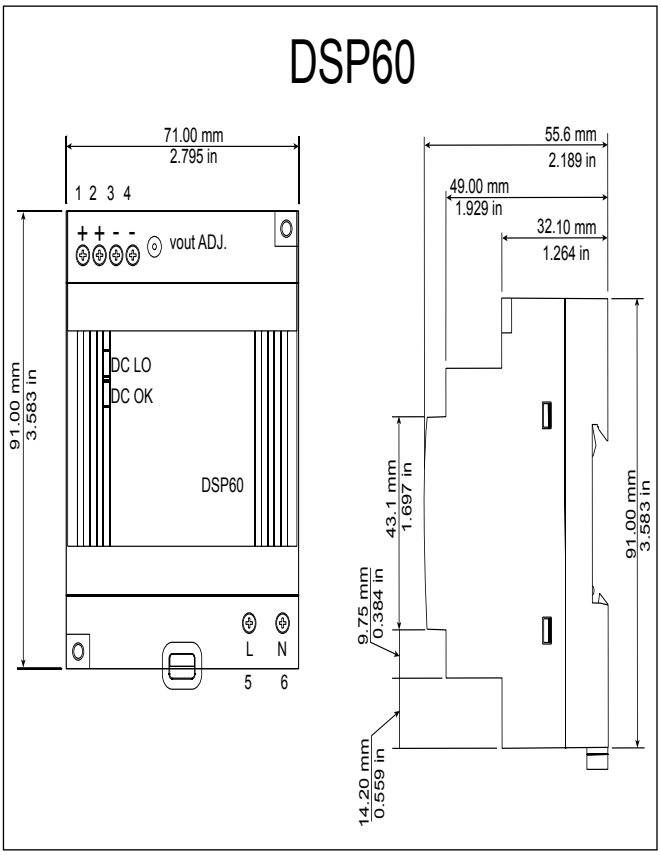
Recommended chassis mount hardware:

1. #8 screw, 3/4" long
2. Torque to 10 -15 in-lb
3. No washers of any kind

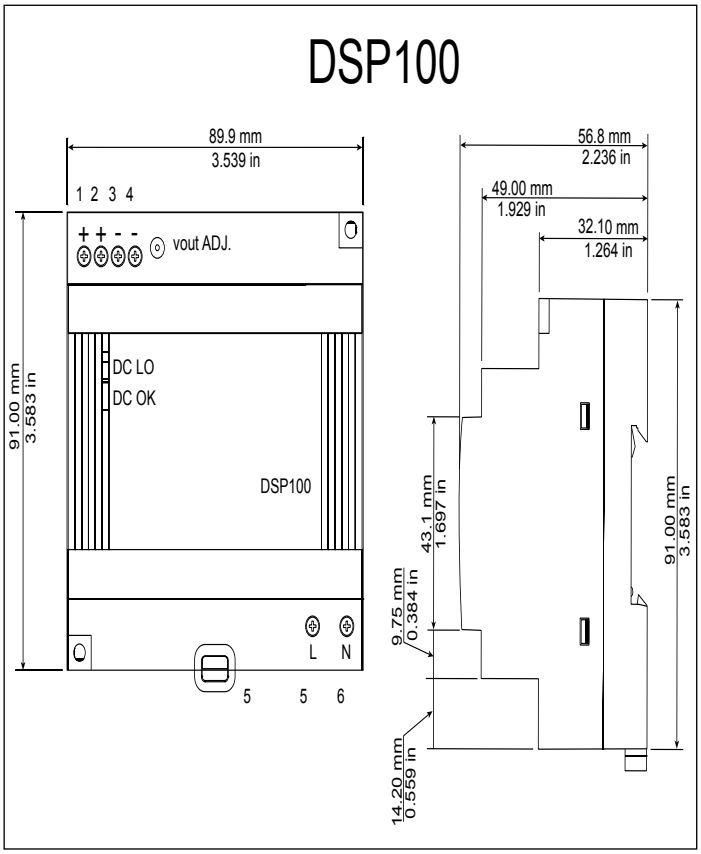
DSP30



DSP60



DSP100



Power Supply Specifications

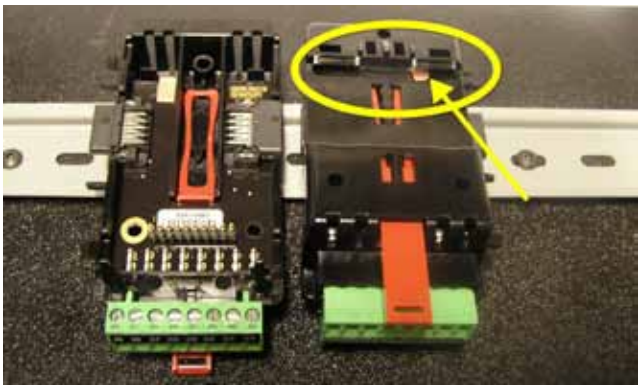
		DSP 30	DSP60	DSP100
AC Input Voltage Range	VAC	90 - 264VAC, Class II double insulated (No ground connection required)		
Input Frequency	Hz	47 - 63Hz		
DC Input Voltage range	VDC	120 - 370VDC		
Inrush Current (115 / 230VAC)	A	25 / 50A	30 / 60A	30 / 60A
Output Voltage Accuracy	%	±1% of Nominal		
Over voltage Protection	V	120 - 145%		
LED Indicators	- - - -	Green LED = On, Red LED = DC Output Low		
Operating Temperature	- - - -	-25 to +71°C (Derate linearly 2.5%/°C from 55 to 71°C)		
Storage Temperature	- - - -	-25 to +85°C		
Operating Humidity	- - - -	20 - 95% RH (non condensing)		
Vibration (Operating)	- - - -	IEC 60068-2-6 (Mounting by rail: Random wave, 10-500 Hz, 2G, ea. along X, Y, Z axes 10 min/cycle, 60 min)		
Safety Agency Certifications	- - - -	UL1310 Class 2(1), UL508 Listed, UL60950-1, EN60950-1, CE		

For a comprehensive listing of these specifications point your browser to : http://us.tdk-lambda.com/lp/products/dsp-series.htm

RMA Installation and Removal on a DIN Rail

Modular Backplane Connector

The picture on the right shows the Modular Backplane Connector, both front and rear view. The rear view is bringing in to focus a metal clip. If the DIN rail is grounded the Modular Backplane Connector and the module connected to it will be also (recommended).



Installing the Modular Backplane Connector

Step 1

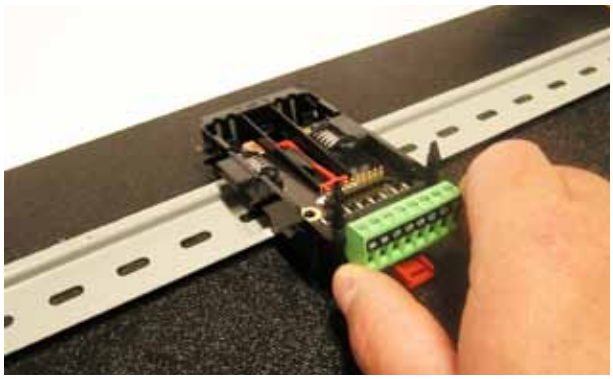
Hook backplane assembly to upper edge of DIN rail, (see rear view above, backplane hook detail that mates with upper rail edge is circled)

Step 2

Next, rotate back plane assembly downward to en gage the lower edge of the rail. (Note: Din Rail clipping distance ranges from 1.366 -1.389 inches. The back plane assembly will not latch onto the rail successfully if the rail is out of dimension).

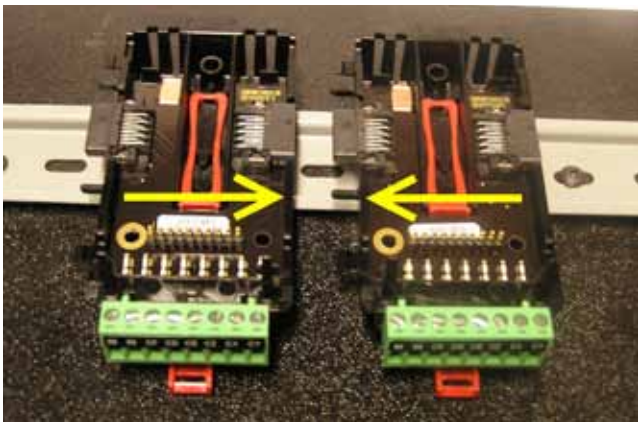
Step 3

For final positioning and locking, the red tab is to be pushed upward to further engage the bottom edge of the rail with an over center snap action latch. (The red locking tab protrudes from the bottom side of the back plane assembly).



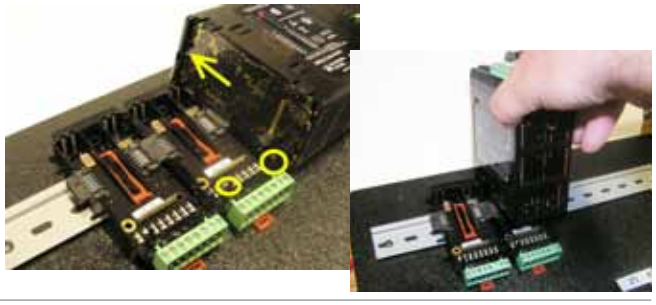
Installing Multiple Modular Backplane Connectors

Multiple modules are easily aligned and latched together. Each module includes matched mating geometry that facilitates accurate and consistent interconnections. The recommended method of multi-module attachment is to first attach individual modules to the rail separately and second to laterally slide the modules together until they touch. (Refer to steps 1&2 above). When the multi-module system is attached and laterally positioned to the desired placement the locking tab should be engaged to secure the control system to the rail, (Refer to step 3 above).



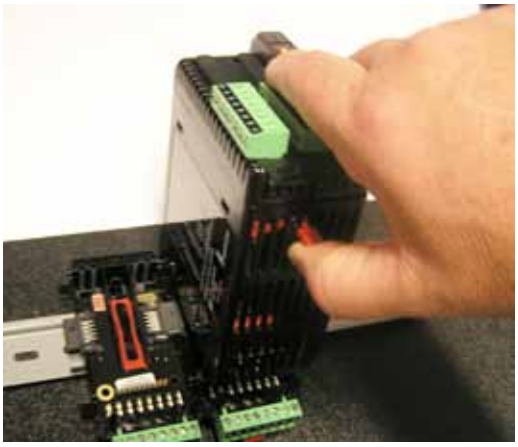
Module Installation

In the picture to the right notice that the arrow is pointing at the top lip of the module (on side). When installing the module simply slide this lip over the top of the Modular Backplane Connector and then push down on the rear of the module where it will seat on the two posts just above the green connector.



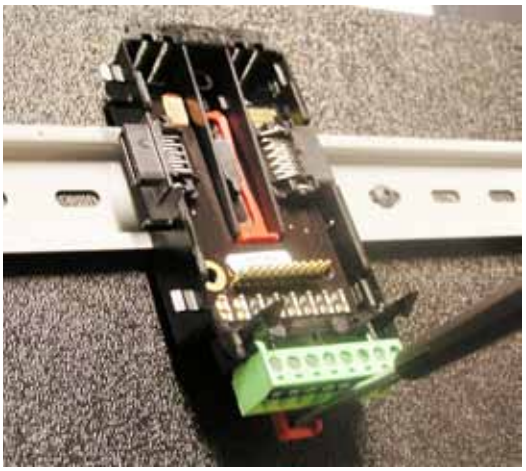
Module Removal

To remove a module from the Modular Backplane Connector find the red tab protruding from the bottom of the module and pull back on it as shown to the right. While pulling back on the red tab the two mounting posts will release the module where the module can then be lifted up and out of the Modular Backplane Connector.



Removal of the Modular Backplane Connector

A module can be removed from the Modular Backplane Connector by inserting a screw driver into the red locking tab just behind the green connector and applying downward pressure on the tab by lifting the screwdriver upwards. When released, the tab will move downward and the connector can then be lifted up off of the DIN rail.

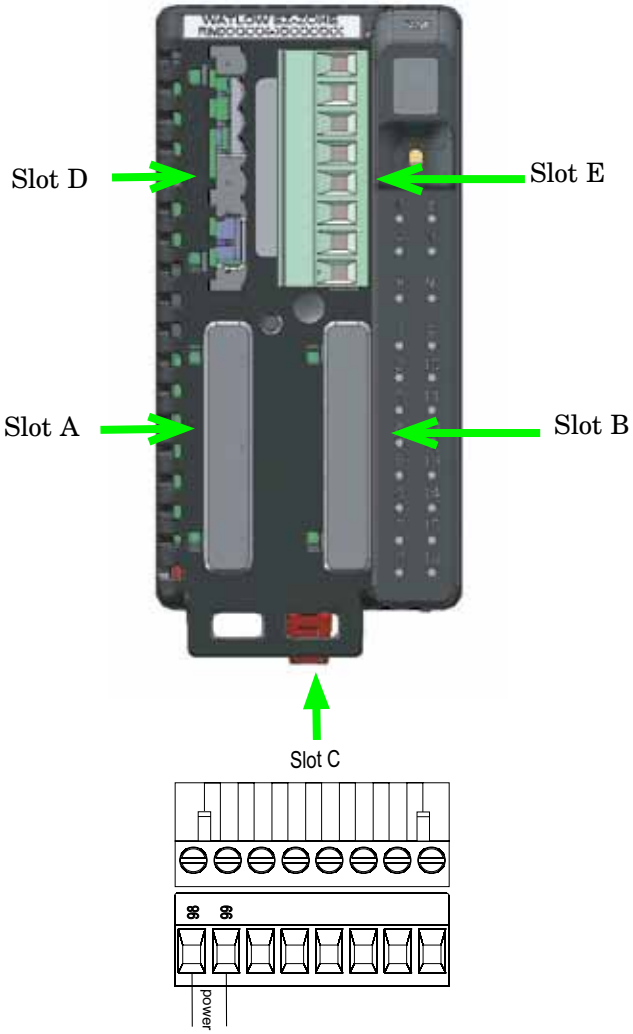


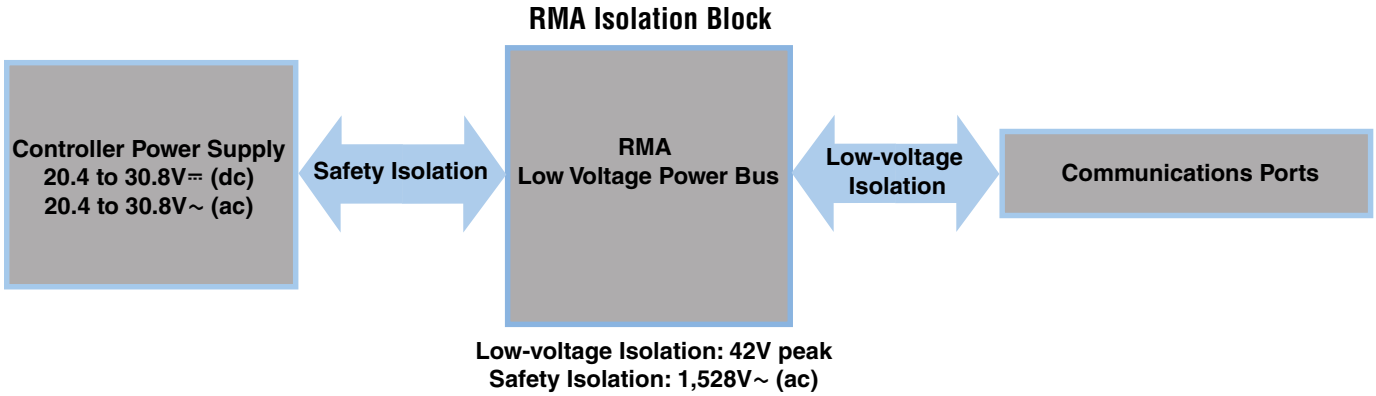
Wiring

Access Module (RMAx-Axxx-xxxx)					
Slot A	**Slot B**	**Slot D**	**Slot E**	**Terminal Function**	**Configuration**
				Modbus RTU	
- - -	- - -	- - -	CB	Modbus RTU EIA-485 T+/R+	Part # Digit 6 Slot A: Not a valid option Slot B: Not a valid option Slot D: Not a valid option Slot E: RMAx-A(**2**)xx-xxxx
- - -	- - -	- - -	CA	Modbus RTU EIA-485 T-/R-	
- - -	- - -	- - -	CC	Modbus RTU EIA-485 common	
- - -	- - -	- - -	CB	Modbus RTU EIA-485 T+/R+	
- - -	- - -	- - -	CA	Modbus RTU EIA-485 T-/R-	
- - -	- - -	- - -	C5	Modbus RTU EIA-232 common	
- - -	- - -	- - -	C3	Modbus RTU EIA-232 DB9/pin 2	
- - -	- - -	- - -	C2	Modbus RTU EIA-232 DB9/pin 3	
				EtherNet/IP and Modbus TCP 10/100	
- - -	- - -	- - -	E8	EtherNet/IP™ and Modbus TCP unused	Part # Digit 6 Slot A: Not a valid option Slot B: Not a valid option Slot D: Not a valid option Slot E: RMAx-A(**3**)xx-xxxx
- - -	- - -	- - -	E7	EtherNet/IP™ and Modbus TCP unused	
- - -	- - -	- - -	E6	EtherNet/IP™ and Modbus TCP receive -	
- - -	- - -	- - -	E5	EtherNet/IP™ and Modbus TCP unused	
- - -	- - -	- - -	E4	EtherNet/IP™ and Modbus TCP unused	
- - -	- - -	- - -	E3	EtherNet/IP™ and Modbus TCP receive +	
- - -	- - -	- - -	E2	EtherNet/IP™ and Modbus TCP transmit -	
- - -	- - -	- - -	E1	EtherNet/IP™ and Modbus TCP transmit +	
				DeviceNet	
- - -	- - -	- - -	V+	DeviceNet™ power	Part # Digit 6 Slot A: Not a valid option Slot B: Not a valid option Slot D: Not a valid option Slot E: RMAx-A(**5**)xx-xxxx
- - -	- - -	- - -	CH	Positive side of DeviceNet™ bus	
- - -	- - -	- - -	SH	Shield interconnect	
- - -	- - -	- - -	CL	Negative side of DeviceNet™ bus	
- - -	- - -	- - -	V-	DeviceNet™ power return	
- - -	- - -	- - -	- - -		
- - -	- - -	- - -	- - -		
- - -	- - -	- - -	- - -		
				Profibus DP	
- - -	- - -	- - -	VP	Voltage Potential	Part # Digit 6 Slot A: Not a valid option Slot B: Not a valid option Slot D: Not a valid option Slot E: RMAx-A(**6**)xx-xxxx
- - -	- - -	- - -	B	EIA-485 T+/R+	
- - -	- - -	- - -	A	EIA-485 T-/R-	
- - -	- - -	- - -	DG	Digital ground (common)	
- - -	- - -	- - -	trB	Termination resistor B	
- - -	- - -	- - -	B	EIA-485 T+/R+	
- - -	- - -	- - -	A	EIA-485 T-/R-	
- - -	- - -	- - -	trA	Termination resistor A	

Power & Standard Bus Communications		
Slot C	**Terminal Function**	**Configuration**
98 99	Power input: ac or dc+ Power input: ac or dc-	All
CF CD CE	Standard Bus EIA-485 common Standard Bus EIA-485 T-/R- Standard Bus EIA-485 T+/R+	Standard Bus
CZ CX CY	Inter-module Bus Inter-module Bus Inter-module Bus	Inter-module Bus

All Modules - Front View -
Standard Connector





Warning:

Use National Electric (NEC) or other country-specific standard wiring and safety practices when wiring and connecting this controller to a power source and to electrical sensors or peripheral devices. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

Note:

Maximum wire size termination and torque rating:

- **0.0507 to 3.30 mm^2 (30 to 12 AWG) single-wire termination or two 1.31 mm^2 (16 AWG)**
- **0.8 Nm (7.0 in-lb.) torque**

Note:

Adjacent terminals may be labeled differently, depending on the model number.

Note:

To prevent damage to the controller, do not connect wires to unused terminals.

Note:

Maintain electrical isolation between digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Note:

This Equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4

Warning:

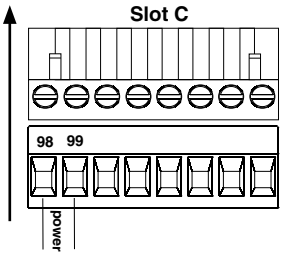
Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.

Warning:

Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

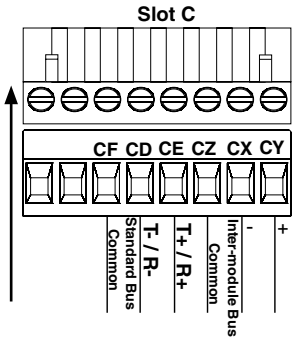
Access Module Wiring (RMAx-xxxx-xxxx)

Low Power

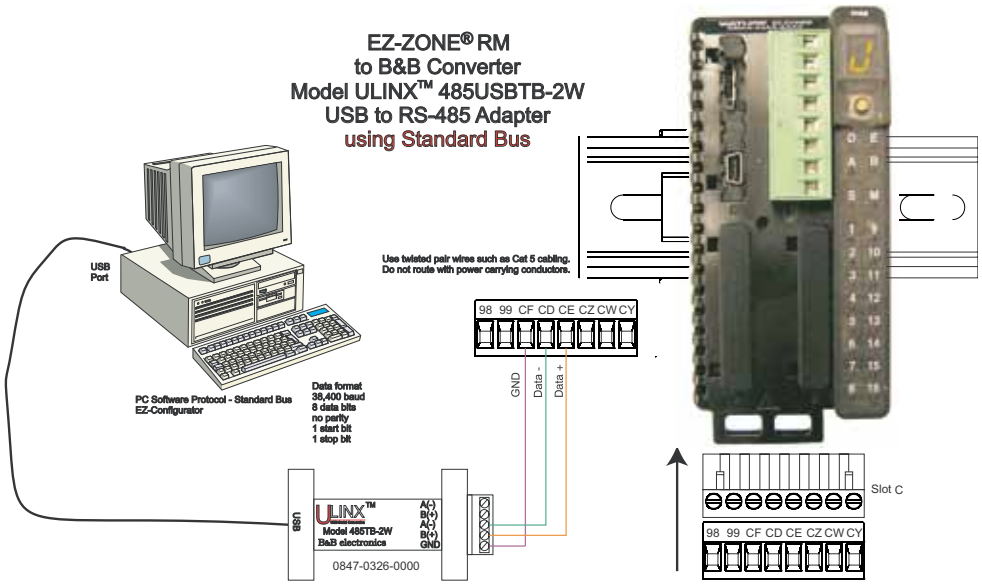


- 20.4 to 30.8 V ~ (ac) / ⎓ (dc)
- 47 to 63 Hz
- Access module power consumption, 4 Watts maximum
- 31 Watts maximum power available for P/S part #:0847-0299-0000
- 60 Watts maximum power available for P/S part #:0847-0300-0000
- 91 Watts maximum power available for P/S part #:0847-0301-0000
- Class 2 or SELV power source required to meet UL compliance standards

Standard Bus EIA-485 Communications

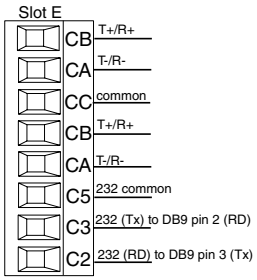


- CF, CD, CE - Standard Bus EIA485 Communications
- CZ, CX, CY - Inter-module Bus EIA485 Communications
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network
- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire common to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.
- A 120 Ω termination resistor may be required across T+/R+ and T-/R-, placed on the last controller on the network.
- Do not connect more than 16 EZ-ZONE RM controllers on a network.
- Maximum network length: 1,200 meters (4,000 feet)
- 1/8th unit load on EIA-485 bus



EIA-232/485 Modbus RTU Communications

RMA Part # Digit 5 and 6 is A2

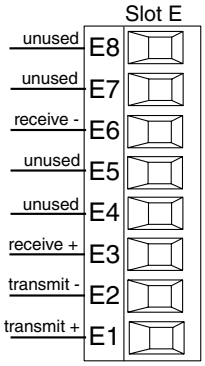


- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire common to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.
- A termination resistor is required. Place a 120 Ω resistor across T+/R+ and T-/R- of last controller on network.
- Maximum number of devices on a Modbus network is 247.
- maximum network length: 1,200 meters (4,000 feet)
- maximum EIA-232 network length: 15 meters (50 feet)
- Do not connect more than one EZ-ZONE RM controller on an EIA-232 network.
- Do not wire to both the EIA-485 and the EIA-232 pins at the same time.
- Two EIA-485 terminals of T/R are provided to assist in daisy-chain wiring.
- 1/8th unit load on EIA-485 bus.

Modbus-IDA Terminal	EIA/TIA-485 Name	Watlow Terminal Label	Function
DO	A	CA or CD	T-/R-
D1	B	CB or CE	T+/R+
common	common	CC or CF	common

EtherNet/IP™ and Modbus TCP Communications

RMA Part # Digit 5 and 6 is A3



RJ-45 pin	T568B wire color	Signal	Slot E
8	brown	unused	E8
7	brown & white	unused	E7
6	green	receive -	E6
5	white & blue	unused	E5
4	blue	unused	E4
3	white & green	receive +	E3
2	orange	transmit -	E2
1	white & orange	transmit +	E1

EtherNet/IP™ and Modbus TCP communications to connect with a 10/100 switch.

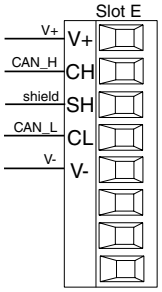
- Do not route network wires with power wires.
- Connect one Ethernet cable per controller to a 10/100 mbps Ethernet switch. Both Modbus TCP and EtherNet/IP™ are available on the network.

Notes:

When using EtherNet/IP the RMA module supports implicit and unconnected explicit messaging.

DeviceNet™ Communications

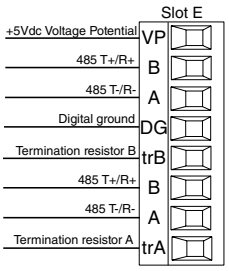
RMA Part # Digit 5 and 6 is A5



Terminal	Signal	Function
V+	V+	DeviceNet™ power
CH	CAN_H	positive side of DeviceNet™ bus
SH	shield	shield interconnect
CL	CAN_L	negative side of DeviceNet™ bus
V-	V-	DeviceNet™ power return

Profibus DP Communications

RMA Part # Digit 5 and 6 is A6



- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire Digital Ground to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.
- A termination resistor should be used if this control is the last one on the network.
- If using a 150 Ω cable Watlow provides internal termination. Place a jumper across pins trB and B and trA and A.
- If external termination is to be used with a 150 Ω cable place a 390 Ω resistor across pins VP and B, a 220 Ω resistor across pins B and A, and lastly, place a 390 Ω resistor across pins DG and A.
- Do not connect more than 16 EZ-ZONE RM modules on any given segment.
- Maximum EIA-485 network length: 1,200 meters (4,000 feet)
- 1/8th unit load on EIA-485 bus.
- Communications instance 2

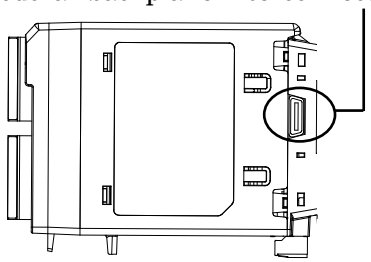
RMAX - A **[6]** X X - A A X X

Profibus Terminal	EIA/TIA-485 Name	Watlow Terminal Label	Function
VP (Voltage Potential)	- - - -	VP	+5Vdc
B-Line	B	B	T+/R+
A-Line	A	A	T-/R-
DP-GND	common	DG	common

RM System Connections

Components of a RM system can be installed as stand alone modules or can be interconnected on the DIN rail as shown below. When modules are connected together, power and communications are shared between modules over the modular backplane interconnection. Therefore, bringing the necessary power and communications wiring to any one connector in slot C is sufficient. The modular backplane interconnect comes standard with every module ordered and is generic in nature, meaning any of the RM modules shown below on the DIN rail can use it.

Modular backplane interconnect



Notice in the split rail system diagram that a single power supply is being used across both DIN rails. One notable consideration when designing the hardware layout would be the available power supplied and the loading affect of all of the modules used. Watlow provides three options for power supplies listed below:

1. 90-264 Vac to 24Vdc @ 31 watts (Part #: 0847-0299-0000)
2. 90-264 Vac to 24Vdc @ 60 watts (Part #: 0847-0300-0000)
3. 90-264 Vac to 24Vdc @ 91 watts (Part #: 0847-0301-0000)

With regards to the modular loading affect, maximum power for each is listed below:

1. RMCxxxxxxxxxxx @ 7 watts
2. RMEx-xxxx-xxxx @ 7 watts
3. RMAx-xxxx-xxxx @ 4 watts

So, in the split rail system diagram, the maximum current draw on the supply would be 38 Watts.

- 2 RMC modules consumes 14W
- 2 RME modules consumes 14W
- 1 RMA module consumes 4W
- 1 Remote User Interface consumes 6W

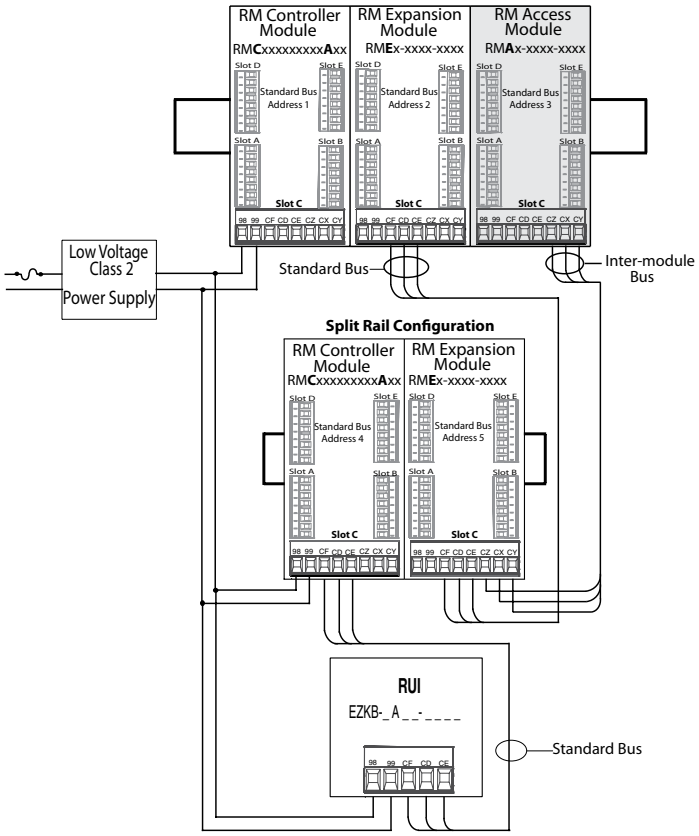
With this power requirement the second or third power supply could be used.

Another hardware configuration scenario that could present itself (graphic not shown) would be a configuration that requires more than one supply. Lets make some assumptions pertaining to the split rail system diagram shown below. The power supply used is the 91W supply. The top DIN rail now has the following modules:

- 2 RMC modules consumes 14W
- 1 RMA consumes 4W
- 11 RME modules consumes 77W

As can now be seen, the total power requirement exceeds 91W. In this case, another power supply would be required. To incorporate another supply in this system simply disconnect pins 99 and 98 on the remote DIN rail and connect another appropriately sized power supply to those same pins.

When using a split rail configuration ensure that the interconnections for the Inter-module Bus and Standard Bus do not exceed 200 feet.



Note:

Module is not provided with a disconnect, use of an external disconnect is required. It should be located in close proximity to the module and be labeled as the disconnect for the module.

Note:

Connecting power supplies in parallel is not allowed. When power consumption is greater than 91 watts use a split rail configuration.

Wiring a Serial EIA-485 Network

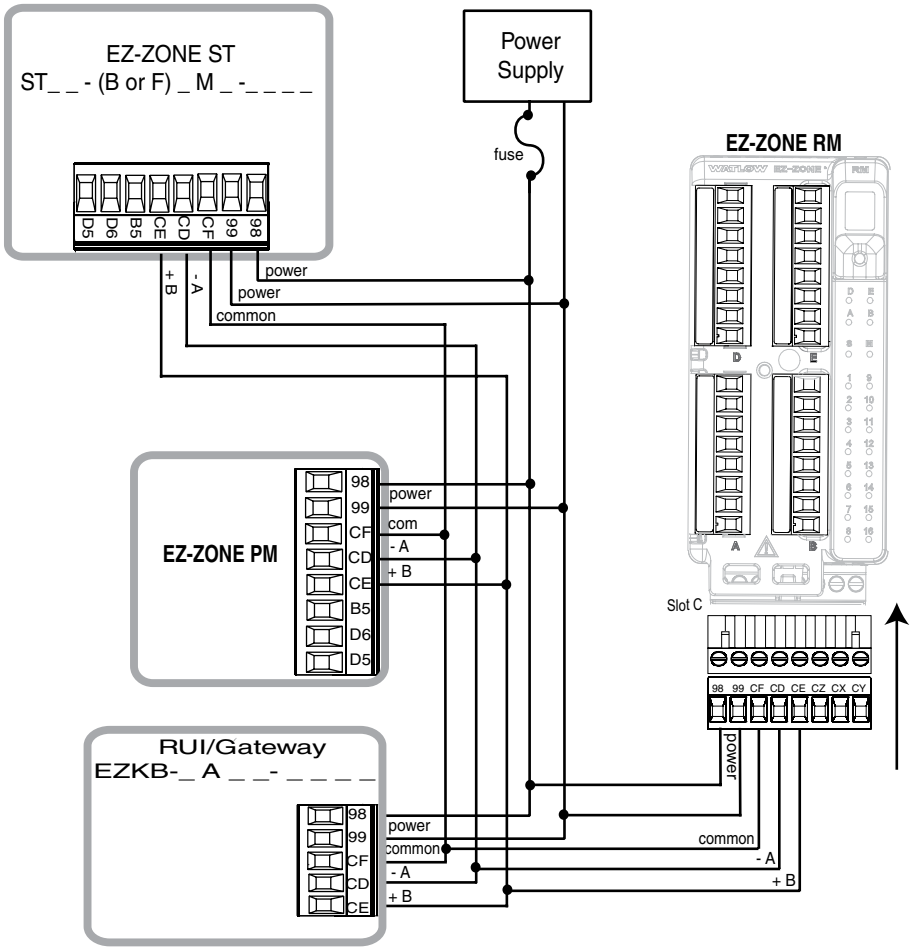
Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.

A termination resistor may be required. Place a 120 Ω resistor across T+/R+ and T-/R- of the last controller on a on a network.

Note:

Termination resistors when used, require a termination resistor at both ends of the network.

A network using Watlow's Standard Bus and an RUI/Gateway.



Conventions Used in the Menu Pages

To better understand the menu pages that follow review the naming conventions used. When encountered throughout this document, the word "default" implies as shipped from the factory. Each page (Operations, Setup and Factory) and their associated menus have identical headers defined below:

Header Name	Definition
Display	Visually displayed information from the control.
Parameter Name	Describes the function of the given parameter.
Range	Defines options available for this prompt, i.e., min/max values (numerical), yes/no, etc... (further explanation below).
Default	Values as delivered from the factory.
Modbus Relative Address	Identifies unique parameters using either the Modbus RTU or Modbus TCP protocols (further explanation below).
CIP (Common Industrial Protocol)	If used in conjunction with an RMA module identifies unique parameters using either the DeviceNet or EtherNet/IP protocol (further explanation below).
Profibus Index	If used in conjunction with an RMA module identifies unique parameters using Profibus DP protocol (further explanation below).
Parameter ID	Identifies unique parameters used with other software such as, LabVIEW.
Data Type R/W	uint = Unsigned 16 bit integer dint = Signed 32-bit, long string = ASCII (8 bits per character) float = IEEE 754 32-bit RWES = **R**eadable **W**ritable **E**EPROM (saved) User **S**et (saved)

Display

When the RMA module is used in conjunction with the RUI (optional equipment) visual information from the module is displayed to the observer using a fairly standard 7 segment display. Due to the use of this technology, several characters displayed need some interpretation, see the list below:

1 = 1	0 = 0	i = i	r = r
2 = 2	A = A	J = J	S = S
3 = 3	b = b	K = K	t = t
4 = 4	c, C = c	L = L	u = u
5 = 5	d = d	M = M	v = v
6 = 6	E = E	n = n	W = W
7 = 7	F = F	o = o	y = y
8 = 8	g = g	P = P	Z = Z
9 = 9	h = h	q = q	

Range

Within this column notice that on occasion there will be numbers found within parenthesis. This number represents the enumerated value for that particular selection. Range selections can be made simply by writing the enumerated value of choice using any of the available communications protocols. As an example, turn to the Operations Page and look at the Backup Menu. To initiate a backup using Modbus simply right the value of 1644 (save) to Modbus register 401271.

Communication Protocols

The RMA module comes with the standard offering of Watlow's Standard Bus protocol used primarily for inter-module communications as well as for configuration using EZ-ZONE Configurator software (free download from Watlow's web site (http://www.watlow.com). Along with Standard Bus, the RMA module has options for several different protocols listed below:

- Modbus RTU 232/485
- EtherNet/IP, Modbus TCP
- DeviceNet
- Profibus DP

Modbus RTU Protocol

All Modbus registers are 16-bits and as displayed in this manual are relative addresses (actual). Some legacy software packages limit available Modbus registers to 40001 to 49999 (5 digits). Many applications today require access to all available Modbus registers which range from 400001 to 465535 (6 digits). Watlow controls support 6 digit Modbus registers.

Note:

In this User's Guide, all values shown representing Modbus addresses are added to 400,001 or 40,001 to acquire the absolute address. As an example, notice above (under the Range header) the Modbus address identified for Backup. Compare this to the value listed for this same parameter found in the Operations

Page under the Backup Menu.

For parameters listed as float notice that only one (low order) of the two registers is listed, this is true throughout this document. By default, the low order word contains the two low bytes of the 32-bit parameter. As an example, look in the RMA Setup Page for the Real Time Clock Value. Find the column identified in the header as Modbus and notice that it lists register 1424. Because this parameter is a float it is actually represented by registers 1424 (low order bytes) and 1425 (high order bytes). The Modbus specification does not dictate which register should be high or low order so Watlow provides the user the ability to swap this order (Setup Page, Communications Menu) from the default low/high to high/low.

It should also be noted that some of the cells in the Modbus column contain wording pertaining to an offset. Several parameters in the RMA contain more than one instance; such as, Data Log points (250), Variables (12), Gateway Instances (16), etc... The Modbus register shown always represents instance one. Take for an example the logging point parameter found in the RMA Setup Page under the Log Point Menu. Instance one for the Source Function is shown as address 1470 and the offset to the next instance is identified as +16. If there was a desire to read or write to instance 3 simply add 32 to 1470 to find its address, in this case, the instance 3 address for Log Point Source Function 3 is 1502.

RMA _ - A **[2, 3]** _ _ - A A _ _

To learn more about the Modbus protocol point your browser to http://www.modbus.org.

Common Industrial Protocol (CIP) DeviceNet & Ethernet/IP

Both DeviceNet and EtherNet/IP use open object based programming tools and use the same addressing scheme. In the following menu pages notice the column header identified as CIP. There you will find the Class, Instance and Attribute in hexadecimal, (decimal in parenthesis) which makes up the addressing for both protocols.

Note:

The RMA module equipped with EtherNet/IP supports implicit and unconnected explicit messages.

Data Types Used with CIP

uint	= Unsigned 16 bit integer
int	= Signed 16-bit
dint	= Signed 32-bits, long
real	= Float, IEEE 754 32-bit
string	= ASCII, 8 bits per character
sint	= Signed 8 bits , byte

RMA _ - A **[3]** _ _ - A A _ _

To learn more about the DeviceNet and EtherNet/IP protocol point your browser to http://www.odva.org.

Profibus DP

To accommodate for Profibus DP addressing the following menus contain a column identified as Profibus Index. Data types used in conjunction with Profibus DP can be found in the table below.

Data Types Used with Profibus DP

Word	= Unsigned 16 bit
INT	= Signed 16-bit Integer
dint	= Signed 32-bit Integer
REAL	= Float, IEEE 754 32-bit
CHAR	= ASCII, 8 bits per character
BYTE	= 8 bits

RMA _ - A **[6]** _ _ - A A _ _

To learn more about the Profibus DP protocol point your browser to http://www.profibus.org

3 Chapter 3: Operations Page

Access Module Operation Page Parameters

To navigate to the Operations Page using the RUI, follow the steps below:

1. From the Home Page, press both the Up and Down keys for three seconds. [A1] will appear in the upper display and [oPEr] will appear in the lower display.
2. Press the Up or Down key to view available menus.
3. Press the Advance Key to enter the menu of choice.
4. If a submenu exists (more than one instance), press the Up or Down key to select and then press the Advance Key to enter.
5. Press the Up or Down key to move through available menu prompts.
6. Press the Infinity Key to move backwards through the levels: parameter to submenu; submenu to menu; menu to Home Page.
7. Press and hold the Infinity Key for two seconds to return to the Home Page.

On the following pages, top level menus are identified with a yellow background color.

Note:

Some of these menus and parameters may not appear, depending on the modules options. See model number information in the Appendix for more information. If there is only one instance of a menu, no submenus will appear.

[dLog]

[oPEr] **Data Logging Menu**
- [dLog] **Data Logging**
- [StAt] **Status**
- [AMnE] **Available Logging Memory**
- [At1] **Available Logging Time**

[bCUP]

[oPEr] **Backup Menu**
- [bCUP] **Backup**
- [StAt] **Status**
- [ZonE] **Zone**

[b.StA]

[oPEr] **Backup Status Menu**

[1] **to** [24]

[b.StA] **Backup (1 to 24)**
- [StAt] **Status**

Access Module • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Profibus Index**	**Parameter ID**	**Data Type & Read/ Write**
dLo9 oPEr **Data Logging Menu**								
StAt [Stat]	*Data Logging* **Status** Status indicates the status of the data logging function. OK means logging can be started or can continue. No Memory can indicate the memory card is full or not present.	noMM No Memory (1637) oH OK (138)	- - - -	1452	0x89 (137) 1 2	50	37002	uint R
AMnE [AME]	*Data Logging* **Available Memory** Available Logging Memory indicates the remaining space available for logging in kilobytes.	0 to 9,999	- - - -	1456	0x89 (137) 1 4	52	37004	uint R
At i [A.ti]	*Data Logging* **Available Logging Time** Available Logging Time when logging is active, indicates the remaining time that logging can continue in hours. When logging is not active, indicates zero.	0 to 9,999 hours	- - - -	1458	0x89 (137) 1 5	53	37005	uint R
bCUP oPEr **Backup Menu**								
StAt [Stat]	*Backup (1 to 6)* **Status** Status indicates the status of the configuration backup function. *Off* - means no backup or restore action is running. *Save* - indicates the configuration of a zone is being saved to backup memory. *Restore* - indicates a saved configuration is being restored to a zone. *Monitor* - When backup is set to restore on a change the RMA will check to see if a module serial number has changed. If so, a restore will take place for that module. *Complete* - indicates that the restoration is complete. *Error* - indicates that the last action failed.	oFF Off (62) SAvE Save (1644) rESt Restore (1645) Mon Monitor (1187) CPLt Complete (18) Err Error (28)	Off	1274	0x8A (138) 1 to 6 3	60	38003	uint R
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

Access Module • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Profibus Index**	**Parameter ID**	**Data Type & Read/ Write**
ZonE [ZonE]	*Backup* **Zone** Current Zone indicates which zone's configuration is being saved or restored or was last saved or restored.	1 to 16	1	1276	0x8A (138) 1 to 0x10 (16) 4	61	38004	uint R
bSta oPEr **Backup Status Menu**								
Stat [Stat]	*Backup* **Status** Status indicates the status of the current or most recent backup function performed on the corresponding zone. *None* - means no backup or restore action is running. *OK* - indicates the zone was successfully restored or saved depending on the operation. *No Memory* - indicates memory is full. *No Module* - indicates that a previous image for the module had been saved but while restoring the module is no longer present. *No Image* - indicates there is no backed up image for a module present on Standard Bus. *Error* - indicates that the last action failed.	nonE None (61) oH OK (1644) noM No Memory (1637) noM No Module (1664) no.I9 No Image (1665) Err Error (28)	None	1280 [offset 6]	0x9A (154) 1 to 0x18 (24) 1	94	54001	uint R
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**								**R: Read** **W: Write** **E: EEPROM** **S: User Set**

4 Chapter 4: Setup Pages

Access Module Setup Page Parameters

To navigate to the Setup Page using the RUI, follow the steps below:

1. From the Home Page, press both the Up ▲ and Down ▼ keys for six seconds. [A 1] will appear in the upper display and [SEt] will appear in the lower display.
2. Press the Up ▲ or Down ▼ key to view available menus.
3. Press the Advance Key ◎ to enter the menu of choice.
4. If a submenu exists (more than one instance), press the Up ▲ or Down ▼ key to select and then press the Advance Key ◎ to enter.
5. Press the Up ▲ or Down ▼ key to move through available menu prompts.
6. Press the Infinity Key ∞ to move backwards through the levels: parameter to submenu; submenu to menu; menu to Home Page.
7. Press and hold the Infinity Key ∞ for two seconds to return to the Home Page.

On the following pages, top level menus are identified with a yellow background color.

Note:

Some of these menus and parameters may not appear, depending on the controller's options. See model number information in the Appendix for more information. If there is only one instance of a menu, no submenus will appear.

Note:

Some of the listed parameters may not be visible. Parameter visibility is dependent upon controller part number.

[glbl]
[SEt] **Global Menu**
- [dPrS] **Display Pairs**
- [USrS] **User Settings Save**
- [USrr] **User Settings Restore**

[cOMM]
[SEt] **Communications Menu**
- [AdrM] **Modbus Address**
- [bAUd] **Baud Rate**
- [PAr] **Parity**
- [MwhL] **Modbus Word Order**
- [IPAM] **IP Address Mode**
- [IPF1] **IP Fixed Address Part 1**
- [IPF2] **IP Fixed Address Part 2**
- [IPF3] **IP Fixed Address Part 3**
- [IPF4] **IP Fixed Address Part 4**
- [IPS1] **IP Fixed Subnet Part 1**
- [IPS2] **IP Fixed Subnet Part 2**
- [IPS3] **IP Fixed Subnet Part 3**
- [IPS4] **IP Fixed Subnet Part 4**
- [IPG1] **Fixed IP Gateway Part 1**
- [IPG2] **Fixed IP Gateway Part 2**
- [IPG3] **Fixed IP Gateway Part 3**
- [IPG4] **Fixed IP Gateway Part 4**
- [MbtE] **Modbus TCP Enable**
- [E IPE] **EtherNet/IP™ Enable**
- [Add] **DeviceNet™ Node Address**
- [bAUd] **Baud Rate DeviceNet™**
- [FCE] **DeviceNet™ Quick Connect Enable**
- [PAdd] **Profibus Address**
- [ALoC] **Profibus Address Lock**
- [StAt] **Profibus Status**
- [C F] **Display Units**
- [nvS] **Non-volatile Save**

[gtwy]
[SEt] **Local Remote Gateway Menu**
[1] **to** [17]
[gtwy] **Local Remote Gateway (1 to 17)**
- [dvEn] **Device Enabled**
- [dvSt] **Device Status**
- [MAoF] **Modbus Address Offset**
- [oSt] **CIP Instance Offset**
- [AonB] **CIP Implicit Assembly Output Member Quantity**
- [A inB] **CIP Implicit Assembly Input Member Quantity**
- [SoF] **Profibus Slot Offset**

[rtC]
[SEt] **Real Time Clock Menu**
- [hour] **Hours**
- [Min] **Minutes**
- [Mon] **Month**
- [dAtE] **Date**
- [YEAr] **Year**
- [doW] **Day of Week**
- [tFor] **Time Format**
- [dFor] **Date Format**

[Pro]
[SEt] **Profile Menu**
- [Pot] **Power Off Time**

[dLog]
[SEt] **Data Logging Menu**
- [PErd] **Period**
- [FAct] **Full Action**
- [SFnA] **Source Function A**
- [S inA] **Source Instance A**
- [S2nA] **Source Zone A**

[LgPt]
[SEt] **Log Point Menu**
[1] **to** [200]
[LgPt] **Log Point (1 to 200)**
- [SFnA] **Source Function A**
- [S inA] **Source Instance A**
- [S2nA] **Source Zone A**
- [dEC] **Display Precision**

[bCUP]
[SEt] **Backup Menu**
- [SAvE] **Save**
- [rESt] **Restore**

[uAr]
[SEt] **Variable Menu**
- [tYPE] **Data Type**
- [Unit] **Units**
- [d in] **Digital**
- [AnLg] **Analog**

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write
GLbL SEt **Global Menu**								
dPrS [dPrS]	*Global* **Display Pairs** Defines the number of Display Pairs.	1 to 10	1	- - - -	0x6A (103) 1 0x1C (28)	- - - -	3028	uint RWES
USr.S [USr.S]	*Global* **User Settings Save** Save all of this controller's settings to the selected set.	nonE None (61) SEt 1 User Set 1 (101) SEt2 User Set 2 (102)	- - - -	26	0x65 (101) 1 0x0E (14)	8	1014	uint RWE
USr.r [USr.r]	*Global* **User Settings Restore** Replace all of this controller's settings with another set.	nonE None (61) SEt 1 User Set 1 (101) SEt2 User Set 2 (102) FCtY Factory (31)	- - - -	24	0x65 (101) 1 0x0D (13)	7	1013	uint RWE
CoMM SEt **Communications Menu**								
Ad.M [Ad.M]	*Communications* **Modbus Address** Set the Modbus address.	1 to 247	1	432	0x96 (150) 2 1	76	17007	uint RWE
bAUd [bAUd]	*Communications* **Baud Rate** Set the speed of this controller's communications to match the speed of the serial network.	9,600 (188) 19,200 (189) 38,400 (190)	9,600	434	0x96 (150) 2 3	74	17002	uint RWE
PAr [PAr]	*Communications* **Parity** Set the parity of this controller to match the parity of the serial network.	nonE None (61) EuEn Even (191) odd Odd (192)	None	436	0x96 (150) 2 4	75	17003	uint RWE
M.hL [M.hL]	*Communications* **Modbus Word Order** Select the word order of the two 16-bit words in the floating-point values.	h iLo Word High Low (1330) Loh i Word Low High (1331)	Low High	438	0x96 (150) 2 5	80	17043	uint RWE
iP.M [iP.M]	*Communications* **IP Address Mode** Select DHCP to let a DHCP server assign an address to this module.	dhCP DHCP (1281) F.Add Fixed Address (1284)	DHCP	- - - -	- - - -	77	17012	uint RWE
ip.F1 [ip.F1]	*Communications* **IP Fixed Address Part 1** Set the IP address of this module. Each device on the network must have a unique address.	0 to 255	169	- - - -	- - - -	- - - -	17014	uint RWE
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Param-eter ID	Data Type & Read/ Write
,P.F2 [ip.F2]	*Communications* **IP Fixed Address Part 2** Set the IP address of this module. Each device on the network must have a unique address.	0 to 255	254	- - - -	- - - -	- - - -	17015	uint RWE
,P.F3 [ip.F3]	*Communications* **IP Fixed Address Part 3** Set the IP address of this module. Each device on the network must have a unique address.	0 to 255	1	- - - -	- - - -	- - - -	17016	uint RWE
,P.F4 [ip.F4]	*Communications* **IP Fixed Address Part 4** Set the IP address of this module. Each device on the network must have a unique address.	0 to 255	1	- - - -	- - - -	- - - -	17017	uint RWE
,P.S1 [ip.S1]	*Communications* **IP Fixed Subnet Part 1** Set the IP subnet mask for this module.	0 to 255	255	- - - -	- - - -	- - - -	17020	uint RWE
,P.S2 [ip.S2]	*Communications* **IP Fixed Subnet Part 2** Set the IP subnet mask for this module.	0 to 255	255	- - - -	- - - -	- - - -	17021	uint RWE
,P.S3 [ip.S3]	*Communications* **IP Fixed Subnet Part 3** Set the IP subnet mask for this module.	0 to 255	0	- - - -	- - - -	- - - -	17022	uint RWE
,P.S4 [ip.S4]	*Communications* **IP Fixed Subnet Part 4** Set the IP subnet mask for this module.	0 to 255	0	- - - -	- - - -	- - - -	17023	uint RWE
,P.g1 [ip.g1]	*Communications* **Fixed IP Gateway Part 1**	0 to 255	0	- - - -	- - - -	- - - -	17026	uint RWE
,P.g2 [ip.g2]	*Communications* **Fixed IP Gateway Part 2**	0 to 255	0	- - - -	- - - -	- - - -	17027	uint RWE
,P.g3 [ip.g3]	*Communications* **Fixed IP Gateway Part 3**	0 to 255	0	- - - -	- - - -	- - - -	17028	uint RWE
,P.g4 [ip.g4]	*Communications* **Fixed IP Gateway Part 4**	0 to 255	0	- - - -	- - - -	- - - -	17029	uint RWE
Mb.E [Mb.E]	*Communications* **Modbus TCP Enable** Activate Modbus TCP.	no No (59) YES Yes (106)	Yes	- - - -	- - - -	78	17041	uint RWE
E,P.E [EiP.E]	*Communications* **EtherNet/IP™ Enable** Activate Ethernet/IP™.	no No (59) YES Yes (106)	Yes	- - - -	- - - -	79	17042	uint RWE
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write
Add [Ad.d]	*Communications* **DeviceNet™ Node Address** Set the DeviceNet™ address for this gateway.	0 to 63	63	- - - -	- - - -	83	17052	uint RWE
bAUd [bAUd]	*Communications* **Baud Rate DeviceNet™** Set the speed of this gateway's communications to match the speed of the serial network.	125 125 kb 250 250 kb 500 500 kb	125	- - - -	- - - -	84	17053	uint RWE
FCE [FC.E]	*Communications* **DeviceNet™ Quick Connect Enable** Allows for immediate communication with the scanner upon power up.	no No (59) YES Yes (106)	No	- - - -	- - - -	- - - -	17054	uint RWE
PAdd [P.Add]	*Communications* **Profibus DP Address** Set the Profibus address for this gateway.	0 to 126	126	- - - -	- - - -	- - - -	17060	uint RWE
ALoc [A.Loc]	*Communications* **Profibus Address Lock** When set to yes the Profibus address cannot be changed using software. Can be changed from the optional RUI.	no No (59) YES Yes (106)	No	- - - -	- - - -	- - - -	17061	uint RWE
StAt [Stat]	*Communications* **Profibus DP Status** Current Profibus status.	rEdy Ready (1662) rn9 Running (149)	- - - -	- - - -	- - - -	- - - -	17062	uint R
C_F [C_F]	*Communications* **Display Units** Select which scale to use for temperature passed over communications port 2.	F F (30) C C (15)	F	440	0x96 (150) 2 6	81	17050	uint RWE
nU.S [nU.S]	*Communications* **Non-volatile Save** If set to Yes all values written to the control will be saved in EEPROM after approximately 3 seconds.	no No (59) YES Yes (106)	Yes	444	0x96 (150) 2 8	82	17051	uint RWE
GtUJ SEt **Local Remote Gateway Menu**								
du.En [du.En]	*Local Remote Gateway (1 to 17)* **Device Enabled** When set to yes the gateway attempts to establish a connection with the specified control.	no No (59) YES Yes (106)	No	452 {offset 20}	0x7C (124) 1 to 11 (17) 2	23	24002	uint RWE
du.St [du.St]	*Local Remote Gateway (1 to 17)* **Device Status** Indicates whether or not a valid connection is made.	oFF Off (62) on On (63)	- - - -	460 {offset 20}	0x7C (124) 1 to 11 (17) 6	- - - -	24006	uint R
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write
[M.oF]	*Local Remote Gateway (1 to 17)* **Modbus Address Offset** When multiple EZ-ZONE controllers are used over Modbus the value entered allows for parameter differentiation from control to the next.	0 to 65,535	0	454 {offset 20}	0x7C (124) 1 to 11 (17) 3	24	24003	uint RWE
[oSt]	*Local Remote Gateway (1 to 17)* **CIP Instance Offset** When executing explicit messages with multiple EZ-ZONE controllers the number entered allows for differentiation from control to control.	0 to 255	0	456 {offset 20}	0x7C (124) 1 to 11 (17) 4	25	24004	uint RWE
[Ao.nb]	*Gateway (1 to 17)* **CIP Implicit Assembly Output Member Quantity** The number entered determines the size of the output (produced) assembly.	0 to 40	- - - -	466 {offset 20}	0x7C (124) 1 to 11 (17) 9	26	24009	uint RWE
[Ai.nb]	*Gateway (1 to 17)* **CIP Implicit Assembly Input Member Quantity** The number entered determines the size of the input (consumed) assembly.	0 to 40		468 {offset 20}	0x7C (124) 1 to 11 (17) 0x0A (10)	27	24010	uint RWE
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write
S.oF [S.of]	*Gateway (1 to 17)* **Profibus DP Slot Offset** Set Profibus instance member offset for this Standard Bus controller.	0 to 254	Instance 1 = 0 Instance 2 = 20 Instance 3 = 40 Instance 4 = 60 Instance 5 = 80 Instance 6 = 100 Instance 7 = 120 Instance 8 = 140 Instance 9 = 160 Instance 10 = 180 Instance 11 = 200 Instance 12 = 220 Instance 13 = 240 Instance 14 = 0 Instance 15 = 0 Instance 16 = 0 Instance 17 = 0	- - - -	0x7C (124) 1 to 11 (17) 0x0B (11)	28	24011	uint RWE
rtC SEt **Real Time Clock Menu**								
hoUr [hoUr]	*Real Time Clock* **Hours** Set hours for the Real Time Clock (0 = midnight)	0 to 23	- - - -	1428	0x88 (136) 1 3	35	36003	uint RW
Min [Min]	*Real Time Clock* **Minutes** Set minutes for the Real Time Clock.	0 to 59	- - - -	1430	0x88 (136) 1 4	36	36004	uint RW
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write
[Mon]	*Real Time Clock* **Month** Set current month for the Real Time Clock.	1 to 12	- - - -	1434	0x88 (136) 1 6	38	36006	uint RW
[dAtE]	*Real Time Clock* **Date** Set the current date for the Real Time Clock.	1 to 31	- - - -	1436	0x88 (136) 1 7	39	36010	uint RW
[YEAr]	*Real Time Clock* **Year** Set the current year for the Real Time Clock.	2008 to 2100	- - - -	1438	0x88 (136) 1 8	40	36008	uint RW
[doW]	*Real Time Clock* **Day of Week** Set the current day of the week for the Real Time Clock.	Sun Sunday (1565) Mon Monday (1559) tuE Tuesday (1560) WEd Wednesday (1561) thUr Thursday (1562) Fri Friday (1563) SAt Saturday (1564)	- - - -	1426	0x88 (136) 1 2	34	36007	uint RW
[t.For]	*Real Time Clock* **Time Format** Use Time Format to select whether time of day is indicated in the data log in hours minutes and seconds HH:MM:SS or simply hours and minutes HH:MM.	HH:MM (1629) HH:MM:SS (1630)	HH:MM	1444	0x88 (136) 1 0x0B (11)	43	36011	uint RW
[d.For]	*Real Time Clock* **Date Format** Use Date Format to select whether dates in the data log are recorded with month before day MM/DD/YYYY or day before month DD/MM/YYYY.	MM/DD/YYYY (1631) DD/MM/YYYY (1632)	MM/DD/ YYYY	1446	0x88 (136) 1 0x0C (12)	44	36012	uint RW
Pro SEt **Profile Menu**								
[Poti]	*Profile Menu* **Power Off Time** Use Power Off Time to set the maximum length of a power interruption in seconds after which profiles should be allowed to continue running. If the power is out for longer than this setting, profiles will be terminated when the power is restored. Set this to zero (0) if profiles should terminate regardless of how long the power has been off.	0 to 9,999	0	- - - -	0x7A (122) 1 0x49 (73)	18	22073	uint RWE
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Param-eter ID	Data Type & Read/ Write
dLoG SEt **Data Logging Menu**								
PErd [PErd]	*Data Logging* **Period** Use Period to set the time in seconds between when records are entered in the data log.	1 to 3,600	10	1450	0x89 (137) 1 1	49	37001	uint RWES
F.Act [F.Act]	*Data Logging* **Full Action** Use Full Action to select whether the data logging function should Stop or begin to Overwrite old data once the data log memory is full. .	StoP Stop (1638) ourt Overwrite (1639)	Stop	1454	0x89 (137) 1 3	51	37003	uint RWES
SFn.A [SFn.A]	*Data Logging* **Source Function A** Select a function with a digital output that will be used to start and stop data logging..	nonE None (61) ALrM Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.g Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) LgC Logic (239) tMr Timer (244) uAr Variable (245)	Variable	1460	0x89 (137) 1 6	- - - -	37006	uint RWES
Si.A [Si.A]	*Data Logging* **Source Instance A** Set the instance of the function selected above.	1 to 24	1	1462	0x89 (137) 1 7	- - - -	37007	uint RWES
SZ.A [SZ.A]	*Data Logging* **Source Zone A** Set the zone of the function selected above. Set Source Zone A to zero to select a source in the Access Module such as Variable 1.	0 to 16	0	1464	0x89 (137) 1 8	- - - -	37008	uint RWES
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write
LGPt SEt **Log Point Menu**								
SFnA SFn.A]	*Log Point (1 to 200)* **Source Function A** Select the source of the point to be logged..	nonE None (61) AI Analog Input, (142) CUrr Current (22) CPr Cool Power, Control Loop (161) hPr Heat Power, Control Loop (160) PUJr Power, Control Loop (73) Lnr Linearization (238) MATH Math (240) PU Process Value (241) SP.C Set Point Closed, Control Loop (242) SP.o Set Point Open, Control Loop (243) uAr Variable (245) ALM Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.G Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) LIM Limit (126) LGC Logic (239) SoF.1 Special Function Output 1 (1532) SoF.2 Special Function Output 2 (1533) SoF.3 Special Function Output 3 (1534) SoF.4 Special Function Output 4 (1535) tMr Timer (244)	None	1470 [offset 16]	0x8B (139) 1 to C8 (200) 1	66	39001	uint RWES
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write
S.iA [Si.A]	*Log Point (1 to 200)* **Source Instance A** Select the instance of the source identified above..	1 to 24	1	1472 [offset 16]	0x8B (139) 1 to C8 (200) 2	67	39002	uint RWES
S2.A [SZ.A]	*Log Point (1 to 200)* **Source Zone A** Select the zone of the source identified above.	0 to 16	0	1474 [offset 16]	0x8B (139) 1 to C8 (200) 3	68	39003	uint RWES
dEC [dEC]	*Log Point (1 to 200)* **Display Precision** Use Display Precision to set how many decimal places to log for the selected item.	Src Source (1539) 0 Whole (105) 0.0 Tenths (94) 0.00 Hundredths (40) 0.000 Thousandths (96)	Source	1482 [offset 16]	0x8B (139) 1 to C8 (200) 7	69	39007	uint RWES
No Display	*Log Point (1 to 200)* **Value** Reflects the present value of the logged point..	-999.999 to 9,999.999	0	1476 [offset 16]	0x8B (139) 1 to C8 (200) 4	- - - -	39004	float R
No Display	*Log Point (1 to 200)* **Error** View reported cause for log point malfunction..	None (61) Open (65) Shorted (127) Measurement Error (149) Bad Calibration Data (139) Ambient Error (9) RTD Error (141) Fail (32) Math Error (1423) Not Sourced (246) Stale (1617)	None	1484 [offset 16]	0x8B (139) 1 to C8 (200) 8	- - - -	39008	uint R
bCUP SEt **Backup Menu**								
SAuE [SAuE]	*Backup* **Save** Set Save to Now to save the configuration of the other zones (modules) in the backup memory. The setting indicates Off when the save action is completed. It can take between 15 and 45 minutes to save the settings of each module.	oFF Off (62) nowJ Now (1646)	Off	1270	0x8A (138) 1 1	58	38001	uint RW
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**								**R: Read** **W: Write** **E: EEPROM** **S: User Set**

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write
rESt [rEst]	*Backup* **Restore** Set Restore to Now to restore the configuration of the other zones (modules) to the settings saved in the backup memory. Select Change to have the configuration feature automatically restore settings whenever a module is replaced with a like (same part number but different serial number) module. The setting indicates Off when the save action is completed. It can take between 15 and 45 minutes to restore the settings of each module. **Note:** During the time it takes to restore the settings the other modules and other features remain active unless turned off by the user. The system may not perform as desired until all the settings are restored.	oFF Off (62) noUJ Now (1646) CHG Change (1647)	Off	1272	0x8A (138) 1 2	59	38002	uint RW
uAr SEt **Variable Menu**								
tYPE [tyPE]	*Variable* **Data Type** Set the variable's data type.	AnLG Analog (1215) dIG Digital (1220)	Analog	1030 [offset 20]	0x66 (102) 1 1	13	2001	uint RWES
Unit [Unit]	*Variable (1 to 8)* **Units** Set the variable's units. **Note:** Units are always in degrees F when used for temperature	AtP Absolute Temperature (1540) rtP Relative Temperature (1541) PUJr Power (73) Pro Process (75) rH Relative Humidity (1538) nonE None (61)	Absolute Temperature	1042 [offset 20]	0x66 (102) 1 to 8 7	- - - -	2007	uint RWES
dIG [dig]	*Variable* **Digital** Set the variable's value.	On On (63) oFF Off (62)	Off	1032 [offset 20]	0x66 (102) 1 2	14	2002	uint RWES
AnLG [AnLg]	*Variable* **Analog** Set the variable's value.	-1,999.000 to 9,999.000	0.0	1034 [offset 20]	0x66 (102) 1 3	15	2003	float RWES
No Display	*Variable* **Output Value** Reflects the present value of the logged point..	-999.999 to 9,999.999	- - - -	1036 [offset 16]	0x66 (102) 1 4	- - - -	2004	float R
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

5 Chapter 5: Factory Pages

Access Module Factory Page Parameters

To navigate to the Factory Page using the RUI, follow the steps below:

1. From the Home Page, press and hold both the Advance and Infinity keys for six seconds.
2. Press the Up or Down key to view available menus.
3. Press the Advance Key to enter the menu of choice.
4. If a submenu exists (more than one instance), press the Up or Down key to select and then press the Advance Key to enter.
5. Press the Up or Down key to move through available menu prompts.
6. Press the Infinity Key to move backwards through the levels: parameter to submenu; submenu to menu; menu to Home Page.
7. Press and hold the Infinity Key for two seconds to return to the Home Page.

On the following pages, top level menus are identified with a yellow background color.

Note:

Some of these menus and parameters may not appear, depending on the controller's options. See model number information in the Appendix for more information. If there is only one instance of a menu, no submenus will appear.

Note:

Some of the listed parameters may not be visible. Parameter visibility is dependent upon controller part number.

LoC
FCty **Security Setting Menu**
- LoC.o **Operations Page**
- PASE **Password Enable**
- rLoC **Read Lock**
- SLoC **Write Security**
- LoCL **Locked Access Level**
- roLL **Rolling Password**
- PAS.u **User Password**
- PAS.A **Administrator Password**

ULoC
FCty **Security Setting Menu**
- CodE **Public Key**
- PASS **Password**

diAG
FCty **Diagnostics Menu**
- S.id **Software ID**
- S.rL **Software Release Version**
- S.Pr **Software Protoype Version**
- S.bLd **Software Build Number**
- Sn **Serial Number**
- dAtE **Date of Manufacture**
- iP.AC **Actual IP Addressing Mode**
- iP.A1 **IP Actual Address Part 1**
- iP.A2 **IP Actual Address Part 2**
- iP.A3 **IP Actual Address Part 3**
- iP.A4 **IP Actual Address Part 4**

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write
LoC FCty **Security Setting Menu**								
LoC.o [LoC.o]	*Security Setting* **Operations Page** Change the security level of the Operations Page.	1 to 3	2	362	0x67 (103) 1 2	- - - -	3002	uint RWE
PASE [PAS.E]	*Security Setting* **Password Enable** If set to on, a password is required to change security clearance level or password.	on On (63) oFF Off (62)	Off	- - - -	- - - -	- - - -	3015	uint RWE
rLoC [rLoC]	*Security Setting* **Read Lock** Set the read security clearance level. The user can access the selected level and all lower levels when using an RUI. If the Write Lockout Security level is higher than the Read Lockout Security, the Read Lockout Security level takes priority.	1 to 5	5	378	0x67 (103) 1 0x0A (10)	- - - -	3010	uint RWE
SLoC [SLoC]	*Security Setting* **Write Security** Set the write security clearance level. The user can access the selected level and all lower levels when using an RUI. If the Write Lockout Security level is higher than the Read Lockout Security, the Read Lockout Security level takes priority.	0 to 5	5	380	0x67 (103) 1 0x0B (11)	- - - -	3011	uint RWE
LoCL [LoC.L]	*Security Setting* **Locked Access Level** Determines user level menu visibility when security is enabled. See Features section under Password Security.	1 to 5	5	- - - -	- - - -	- - - -	3016	uint RWE
No Display	*Security Setting* **Locked State** Current level of security	Lock (228) User (1684) Admin (1685)	- - - -	- - - -	- - - -	- - - -	3023	uint R
roLL [roLL]	*Security Setting* **Rolling Password** If set on, the password changes each time the controller's power is cycled. The Public Key is used to determine the present password changes.	on On (63) oFF Off (62)	Off	- - - -	- - - -	- - - -	3019	uint RWE
PASu [PAS.u]	*Security Setting* **User Password** Set user password - Used to acquire access to menus made available through the Locked Access Level setting.	10 to 999	63	- - - -	- - - -	- - - -	3017	uint RWE
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with another interface. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write
PAS.A [PAS.A]	*Security Setting* **Administrator Password** Set administrator password - Used to acquire full access to change passwords.	10 to 999	156	- - - -	- - - -	- - - -	3018	uint RWE
ULoC FCty **Security Setting Menu**								
CodE [CodE]	*Security Setting* **Public Key** The Public Key is used to determine the present password if the password is unknown. If Rolling Password is turned on, this will generate a new random number every time the power is cycled. If Rolling Password is off, a fixed number will be displayed.	Customer Specific	- - - -	- - - -	- - - -	- - - -	3020	uint R
PASS [PASS]	*Security Setting* **Password** If password is enabled, enter password here to access lock settings or password changes.	-1999 to 9999	0	- - - -	- - - -	- - - -	3022	int RW
diAG FCty **Diagnostics Menu**								
S.id [S.id]	*Diagnostics Menu* **Software ID**	0 to 2,147,483,647	- - - -	2	0x65 (101) 1 2	- - - -	1002	dint R
S.rL [S.rL]	*Diagnostics Menu* **Software Release Version**	0 to 2,147,483,647	- - - -	4	0x65 (101) 1 3	- - - -	1003	dint R
S.Pr [S.Pr]	*Diagnostics Menu* **Software Prototype Version**	0 to 2,147,483,647	- - - -	6	0x65 (101) 1 4	- - - -	1004	dint R
S.bLd [S.bLd]	*Diagnostics Menu* **Software Build Number** Display the firmware build number.	0 to 2,147,483,647	- - - -	8	0x65 (101) 1 5	- - - -	1005	dint R
Sn [Sn]	*Diagnostics Menu* **Serial Number** Display the serial number.	0 to 2,147,483,647	- - - -	12	0x65 (101) 1 7	- - - -	1007	dint RWE
dAtE [dAtE]	*Diagnostics Menu* **Date of Manufacture** Display the date code.	0 to 2,147,483,647	- - - -	14	0x65 (101) 1 8	- - - -	1008	dint RWE
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with another interface. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write
iP.AC [iP.AC]	*Diagnostics Menu* **Actual IP Addressing Mode**	none None (61) dhCP DHCP (1281) FAdd Fixed Address (1284) FAiL Fail (32)	DHCP	- - - -	- - - -	- - - -	17013	uint RW
iPA1 [iP.A1]	*Diagnostics Menu* **IP Actual Address Part 1**	0 to 255	- - - -	- - - -	- - - -	- - - -	17044	uint RW
iPA2 [iP.A2]	*Diagnostics Menu* **IP Actual Address Part 2**	0 to 255	- - - -	- - - -	- - - -	- - - -	17045	uint RW
iPA3 [iP.A3]	*Diagnostics Menu* **IP Actual Address Part 3**	0 to 255	- - - -	- - - -	- - - -	- - - -	17046	uint RW
iPA4 [iP.A5]	*Diagnostics Menu* **IP Actual Address Part 4**	0 to 255	- - - -	- - - -	- - - -	- - - -	17047	uint RW
No Display	*Diagnostics Menu* **Hardware ID**	0 to 2147483647	25	0	0x65 (101) 1 1	- - - -	1001	dint R
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with another interface. **If there is only one instance of a menu, no submenus will appear.**								**R: Read W: Write E: EEPROM S: User Set**

6 Chapter 6: RMA Features

Saving And Restoring User Settings

Recording setup and operations parameter settings for future reference is very important. If you unintentionally change these, you will need to program the correct settings back into the controller to return the equipment to operational condition.

After you program the controller and verify proper operation, use User Save Set [USr.S] (Setup Page, Global Menu) to save the settings into either of two files in a special section of memory. If the settings in the controller are altered and you want to return the controller to the saved values, use User Restore Set [USr.r] (Setup Page, Global Menu) to recall one of the saved settings.

Note:
Perform the above procedure when you are sure that all the correct settings are programmed into the module. Saving the settings overwrites any previously saved collection of settings. Be sure to document all of the module settings.

Using Lockout to Hide Pages and Menus

If unintentional changes to parameter settings might raise safety concerns or lead to downtime, your can use the lockout feature to make them more secure.

Each of the menus in the Factory Page and each of the pages, except the Factory Page, has a security level assigned to it. You can change the read and write access to these menus and pages by using the parameters in the Lockout Menu (Factory Page).

Lockout Menu

There are three parameters in the Lockout Menu that can be used to restrict access to various menu's in the RMA module that can be found in the Factory Page, Security [LoC] Setting Menu:

- Lock Operations Page [LoC.o] sets the security level for the Operations Page (default: 2).

Note:

The Home and Setup Page lockout levels are fixed and cannot be changed.

- Read Lockout Security [rLoC] determines which pages can be accessed. The user can access the selected level and all lower levels. (default: 5)
- Write Lockout Security [SLoC] determines which parameters within accessible pages can be written to. The user can write to the selected level and all lower levels. (default: 5)
- Locked Access Level [LoC.L] determines user level menu visibility when an RUI is in use.

Note:

The menu lockout function applies only when an RUI (optional hardware) is in use. This setting has no impact when using EZ-ZONE Configurator software.

The table below represents the various levels of lockout for the Write Lockout Security prompt and the Read Lockout Security prompt. The Write Lockout has 6 levels (0-5) of security where the Read Lockout has 5 (1-5). Therefore, level "0" applies to Set Lockout only. "Y" equates to yes (can write/read) where "N" equates to no (cannot write/read). The colored cells simply differentiate one level from the next.

Lockout Security [SLoC] & [rLoC]						
Lockout Level	0	1	2	3	4	5
Home Page	Y	Y	Y	Y	Y	Y
Operations Page	N	N	Y	Y	Y	Y
Setup Page	N	N	N	N	Y	Y
Factory Page						
Diagnostic Menu	N	Y	Y	Y	Y	Y
Lockout Menu						
[LoC.O]	N	Y	Y	Y	Y	Y
[PAS.E]	N	Y	Y	Y	Y	Y
[rLoC]	Y	Y	Y	Y	Y	Y
[SLoC]	Y	Y	Y	Y	Y	Y

The following examples show how the Lockout Menu parameters may be used in applications:

1. If Set Lockout Security [SLoC] is set to 0 and Read Lockout Security [rLoC] is set to 5, all pages will be accessible, however, changes will not be allowed on any pages or menus, with one exception: Set Lockout Security [SLoC] can be changed to a higher level.
2. The operator wants to read all the menus and not allow any parameters to be changed.

   In the Factory Page, Lockout Menu, set Read Lockout Security [rLoC] to 5 and Set Lockout Security [SLoC] to 0.
3. The operator wants to read the Operations Page, Setup Page, Diagnostics Menu and the Lock Menu. The operator also wants to read and write to the Home Page.

   In the Factory Page, Lockout Menu, set Read Lockout Security [rLoC] to 1 and Set Lockout Security [SLoC] to 5.

   In the Factory Page, Lockout Menu, set Lock Operations Page [LoC.O] to 2.

Using Password Security

It is sometimes desirable to apply a higher level of security to the module where a limited number of menus are visible while not providing access to others without a security password. Without the appropriate password those menus will remain inaccessible. If Password Enabled [PAS.E] in the Factory Page under the Lock [LoC] Menu is set to on, an overriding Password Security will be in effect. When in effect, the only Pages that a User without a password has visibility to are defined in the Locked Access Level [LoC.L] prompt. On the other hand, a user

with a password would have visibility restricted by the Read Lockout Security [rLoC]. As an example, with Password Enabled and the Locked Access Level [LoC.L] set to 1 and [rLoC] is set to 3, the available Pages for a user without a password would be limited to the Home and Factory Pages (locked level 1). If the user password is entered all pages would be accessible with the exception of the Setup Page as defined by level 3 access.

How to Enable Password Security

1. Go to the Factory Page by holding down the Infinity key and the Advance key for approximately six seconds.
2. Again push the Advance key until the Password Enabled [PAS.E] prompt is visible. Lastly, push either the up or down key to turn it on.

Once Password Enable is turned on, 4 new prompts will appear:

3. [LoC.L] - Locked Access Level (1 to 5) correspond ing to the lockout table above.
4. [roLL] - Rolling Password will change the Customer Code every time power is cycled.
5. [PAS.U], User Password which is needed for a User to acquire access to the control.
6. [PAS.A], Administrator Password which is needed to acquire administrative access to the control.

The Administrator can either change the User and or the Administrator password or leave them in the default state. Once Password Security is enabled they will no longer be visible to anyone other than the Administrator. As can be seen in the formula that follows, either the User or Administrator will need to know what those passwords are to acquire a higher level of access to the control. Back out of this menu by pushing the Infinity key. Once out of the menu, the Password Security will be enabled.

How to Acquire Access to the Module

To acquire access to any inaccessible Pages or Menus, go to the Factory Page and enter the Unlock [ULoC] Menu. Once there follow the steps below:

Note:

The unlock menu will appear only if the Password Enable prompt has been enabled.

1. Acquire either the User Password [PAS.U] or the Administrator Password [PAS.A].
2. Push the Advance key one time where the Code [CodE] prompt will be visible.

Note:

a. If the the Rolling Password is off push the Advance key one more time where the Password [PASS] prompt will be displayed. Proceed to either step 7a or 8a. Pushing the Up or Down arrow keys enter either the User or Administrator Password. Once entered, push and hold the Infinity key for two seconds to return to the Home Page.

b. If the Rolling Password [roLL] was turned on proceed on through steps 3 - 9.

3. Assuming the Code [CodE] prompt (Public Key) is still visible on the face of the control simply push the Advance key to proceed to the Password [PASS] prompt. If not find your way back to the Factory Page as described above.
4. Execute the calculation defined below (7b or 8b) for either the User or Administrator.
5. Enter the result of the calculation in the upper display by using the Up and Down arrow keys or use EZ-ZONE Confgurator Software.
6. Exit the Factory Page by pushing and holding the Infinity key for two seconds.

Formulas used by the User and the Administrator to calculate the Password follows:

Passwords equal:

7. **User**
   a. If Rolling Password [roLL] is Off, Password [PASS] equals User Password [PAS.U].
   b. If Rolling Password [roLL] is On, Password [PASS] equals: ([PAS.U] x code) Mod 929 + 70
8. **Administrator**
   a. If Rolling Password [roLL] is Off, Password [PASS] equals User Password [PAS.A].
   b. If Rolling Password [roLL] is On, Password [PASS] equals:
   ([PAS.A] x code) Mod 997 + 1000

Differences Between a User Without Password, User With Password and Administrator

- User **without** a password is restricted by the Locked Access Level [LoC.L].
- A User **with** a password is restricted by the Read Lockout Security [rLoC] never having access to the Lock Menu [LoC].
- An Administrator is restricted according to the Read Lockout Security [rLoC] however, the Administrator has access to the Lock Menu where the Read Lockout can be changed.

Real Time Clock (RTC)

The RTC is used with the RMC module equipped with the profiling feature and Data Logging (date and time stamp). With a little thought (using wait-for steps, logic and compare functions), the programmer can use the RTC to synchronize RMC profile engines.

While executing a profile the application requirements may dictate that if power is lost and then restored that the profile execution automatically terminate or conversely continue where it left off based on how long the power was out. Within the Setup Page under the Profile Menu a parameter can be found that addresses this need; it is called the "Power Off Time" [PoT.]. This time is defined in seconds and a

RTC is required to use this feature. As an example, if the Power Off Time were set to 300 and the power is lost while a profile is executing and then restored before 5 minutes expires, the profile would continue where it was at prior to the loss of power. If the power were to be restored after 300 seconds expires the profile would be terminated.

Data Logging

The RMA module equipped (RMAX-XXX**D**-XXXX) and configured for data logging is capable of recording data points every second to every hour. This setting (Period, [PErd]) can be found in the Setup Page under the Data Logging Menu. All recording is stored to an SD card on the RMA module where all data points must be from RM modules on the same Inter-module Bus network. The RMA module equipped with this feature is shipped with a 2 GB card. If a user chose to use one of their own there is no limitation with regards to the size of the SD card that can be used.

Along with the setting for the frequency of the writing activity there is another setting that the user will set (Full Action, [F.Act]) that determines how the RMA module will react when the card becomes full, as the name implies. When free memory is less than 1 MB, the card is considered to be full. This setting can also be found on the Setup Page under the Data Logging Menu. There are two actions that can be taken when this condition exists:

1. Stop
2. Overwrite - then delete oldest files first until an additional 1.5 MB is available.

The file name and folder structure as it is stored to the SD card is defined in the RMA firmware and can be seen below. When the file number needs to increment, the current file shall be closed and the new file will be opened. Conditions that can cause the file number to increment:

- RMA module powers up
- RTC date changes

- File size reaches the maximum size of 1 MB
- Number of lines exceeds maximum number of lines supported by Microsoft Excel
- Defined log points are changed
- USB mounts and dismounts the SD card

All files saved to the SD card are in comma delimited format where they can be easily opened using any software package capable of reading *.csv files, such as Microsoft® Excel. After data logging is complete the SD card can be read via an SD card reader or from the RMA module directly. To connect the PC directly to the RMA module simply connect a mini-USB cable to the RMA and a type B (for most computers) USB cable to the PC.

Note:

All data logging will discontinue after a USB cable is connected from the PC to the RMA module.

Once connected to the SD card, drill down to the data files and simply open it up using your software of choice to see the recorded data. The data below was recorded from an RMC module (zone 8). The date and time formats can be changed (Setup Menu, RTC Menu) along with the precision of the data (Setup Page, Log Point Menu).

	A	B	C	D	E
1	Date	Time	8-Analog Input1(°F)	8-Analog Input2(°F)	8-Analog Input3(°F)
2	10/21/2010	14:15:11	80.1	81.73	82.29
3	10/21/2010	14:15:12	80.14	81.73	82.29
4	10/21/2010	14:15:13	80.1	81.74	82.29
5	10/21/2010	14:15:14	80.07	81.72	82.27
6	10/21/2010	14:15:15	80.05	81.72	82.29
7	10/21/2010	14:15:16	80.1	81.71	82.29
8	10/21/2010	14:15:17	80.09	81.7	82.3
9	10/21/2010	14:15:19	80.05	81.71	82.3
10	10/21/2010	14:15:20	80.13	81.71	82.29

Backup

The RMA module equipped with limited backup capabilities (RMAX-XXX**A**-XXXX) can backup no more than 4 RM modules. It will do so from the lowest to highest zone number. Because this option stores the backup information for these modules in the on-board memory of the RMA itself, there are some dependencies that must be considered. All four modules will be backed up if no more than 2 modules has profiling capabilities. If there are more than 2 modules with profiling the last module will not be backed up. If all 4 have profiling just 2 out of the 4 modules will be backed up. If there is a need to backup all modules the unlimited version must be used. The unlimited version (RMAX-XXX**[B,Y,D]**-XXXX) stores all backup information to the SD card for all RM modules on the Standard Bus network from the lowest to highest zone number.

Note:

While performing a backup if the SD card runs out of memory the backup will occur on zones up to the last zone that fit on the SD Card. For this reason, it would make sense to perform a backup of all RM modules prior to data logging.

Restore

If the user sets Restore to Now, all modules that had been previously backed up will be restored from the lowest zone to the highest assuming zone address and the part numbers are the same.

If the user sets Restore to Change, the RMA will restore all modules with a serial number change. For this to occur the zone address and part numbers for the swapped out modules must be identical to those that had been previously backed up.

Software Configuration

Using EZ-ZONE® Configurator Software

To enable a user to configure the RMA module using a personal computer (PC), Watlow has provided free software for your use (Windows® XP only). If you have not yet obtained a copy of this software insert the CD (Controller Support Tools, delivered with the module) into your CD drive and install the software. Alternatively, if you are viewing this document electronically and have a connection to the internet simply click on the link below and download the software from the Watlow web site free of charge.

http://www.watlow.com/products/software/zone_config.cfm

Once the software is installed double click on the EZ-ZONE Configurator icon placed on your desktop during the installation process. If you cannot find the icon follow the steps below to run the software:

1. Move your mouse to the "Start" button
2. Place the mouse over "All Programs"
3. Navigate to the "Watlow" folder and then the subfolder "EZ-ZONE Configurator"
4. Click on EZ-ZONE Configurator to run.

The first screen that will appear is shown below.

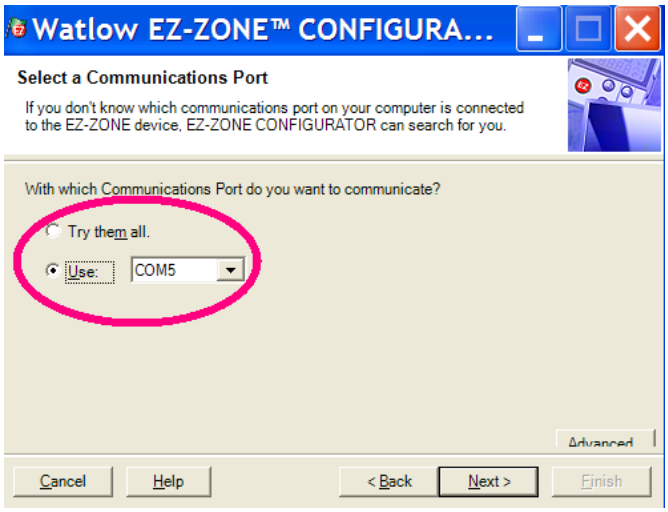
If the PC is already physically connected to the RMA module click the next button to go on-line.

Note:

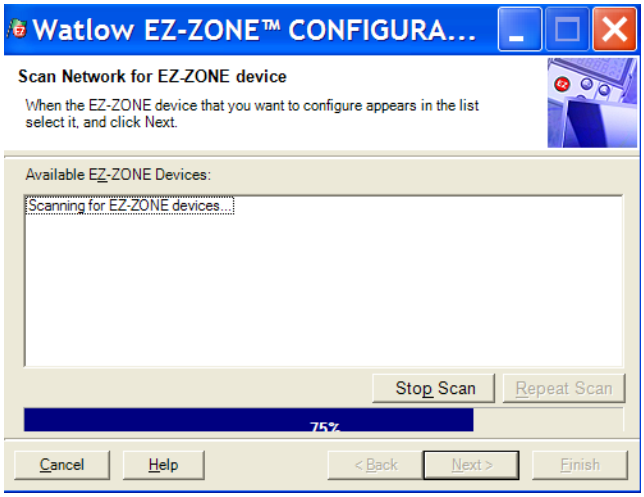
When establishing communications from PC to the RMA module an interface converter will be required. The Standard Bus network uses EIA-485 as the interface. Most PCs today would require a USB to EIA-485 converter. However, some PCs may still be equipped with EIA-232 ports, therefore an EIA-232 to EIA-485 converter would be required.

As can be seen in the above screen shot the software provides the user with the option of downloading a previously saved configuration as well as the ability to create a configuration off-line to download later. The screen shots that follow will take the user on-line.

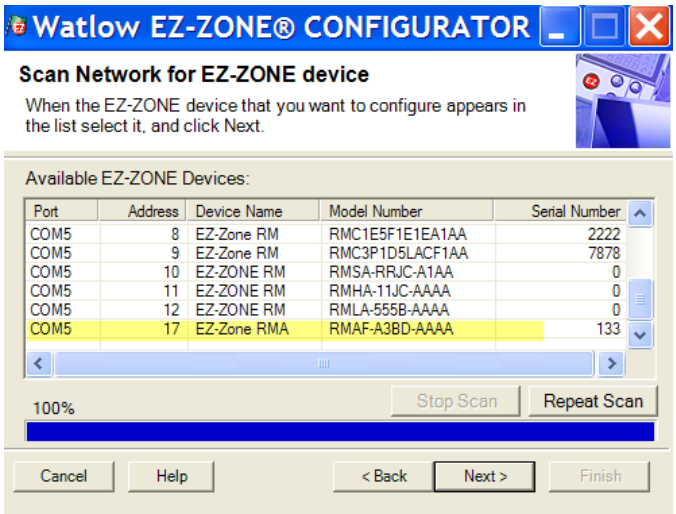
After clicking the next button above it is necessary to select the communications port on the PC to use.



The available options allow the user to select "Try them all" or to use a specific known communications port. After installation of your converter if you are not sure which communications port was allocated select "Try them all" and then click next. The screen to follow shows that the software is scanning for devices on the network and that progress is being made.

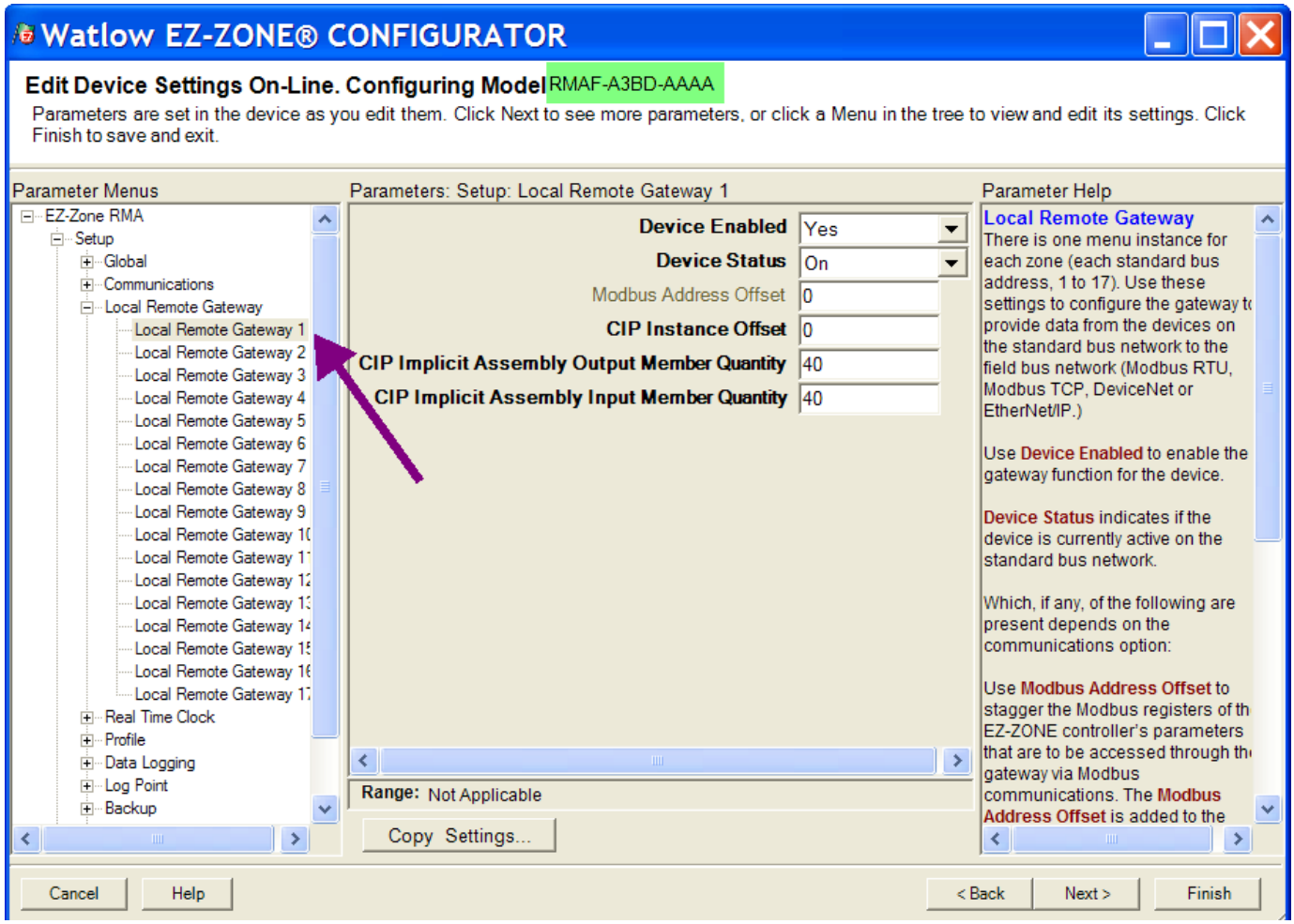


When complete the software will display all of the available devices found on the network as shown below.



In the previous screen shot the RMA is shown highlighted to bring greater clarity to the module in focus. Any EZ-ZONE device on the network will appear in this window and would be available for the purpose of configuration or monitoring. After clicking on the module of choice simply click the next button once again. The next screen appears below.

erations Menu will appear next and perhaps deliver more clarity for the area of focus by not displaying unwanted menus and parameters. Once the focus is brought to an individual parameter (single click of mouse) as is the case for Local Remote Gateway 1 in the left column, all that can be setup related to that parameter will appear in the center column. The



In the screen shot above notice that the device part number is clearly displayed at the top of the page (green highlight added for emphasis). When multiple EZ-ZONE devices are on the network it is important that the part number be noted prior to configuring so as to avoid making unwanted configuration changes to another control.

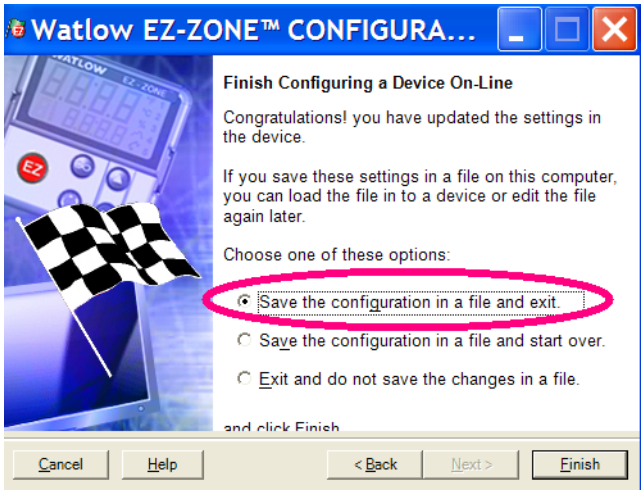
Looking closely at the left hand column (Parameter Menus) notice that it displays all of the available menus and associated parameters within the control. The menu structure as laid out within this software follows:

- Setup
- Operations
- Factory

Navigating from one menu to the next is easy and clearly visible. Simply slide the scroll bar up or down to display the menu and parameter of choice. As an alternative, clicking on the negative symbol next to Setup will collapse the Setup Menu where the Op-

grayed out field in the center column simply means that those parameters do not apply. In this particular case, Modbus TCP Enable has been set to No under the Communications Menu, therefore, it is not possible to define the Modbus Address Offset. To speed up the process of configuration notice that at the bottom of the center column there is an option to copy settings. If Gateway 1, 2 and 3 will be configured the same click on "Copy Settings" where a copy from / to dialog box will appear allowing for quick duplication of all settings. Notice too, that by clicking on any of those items in the center column that context sensitive help will appear for that particular item in the right hand column.

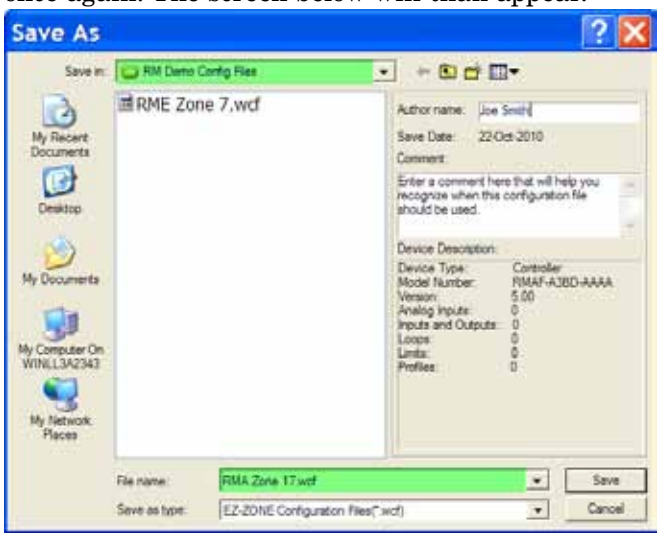
Lastly, when the configuration is complete click the "Finish" button at the bottom right of the previous screen shot. The screen that follows this action can be seen below.



Although the RMA module now contains the configuration (because the previous discussion focused on doing the configuration on-line) it is suggested that after the configuration process is completed that the user save this file on the PC for future use. If for some reason someone inadvertently changed a setting without understanding the impact it would be easy and perhaps faster to download a saved configuration back to the control versus trying to figure out what was changed.

Of course, there is an option to exit without saving a copy to the local hard drive.

After selecting Save above click the "Finish" button once again. The screen below will than appear.



When saving the configuration note the location where the file will be placed (Saved in) and enter the file name (File name) as well. The default path for saved files follows:

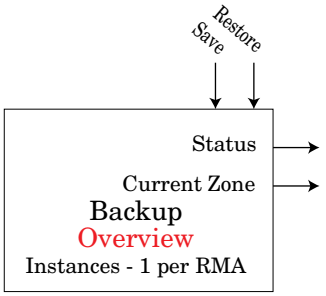
\Program Files\Watlow\EZ-ZONE CONFIGURATOR\Saved Configurations

The user can save the file to any folder of choice.

Function Block Descriptions

Each of the next several pages graphically shows each of the RMA function blocks. Note that as you view each you will find text that is black and text that appears gray. The gray text represents inputs that are not currently available based on the functions defined use (red text). For instance, when the defined use of the Ethernet IP Address Mode is set to DHCP (where a DHCP host supplies the IP address) all fields for the IP address will appear gray.

Backup / Restore Function



bCUP Backup Menu
SEt Setup Page

- SAuE Save : Off, Now
- rESt Restore : Off, Now, Change

bCUP Backup Menu
oPEr Operation Page

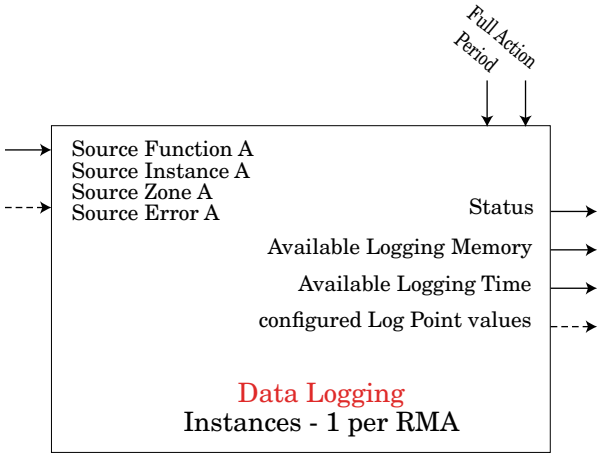
- STAt Status : Off, Save, Restore, Monitor, Complete, Error
- Zone Current Zone : 1 to 16

bSt A Backup Status
oPEr Operation Page

- STAt Status : None, OK, No Memory, No Module, No Image, Error

Data Logging Function

Use Source Function A to activate logging.



dLog Data Logging Menu
SEt Setup Page

- PErd Period : 1 to 3,600 seconds
- FAct Full Action : Stop, Overwrite
- SFnA Source Function A (Logging Enable) : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Logic, Timer, Variable
- S iA Source Instance A : 1 to 24
- S2ZA Source Zone A : 0 to 16

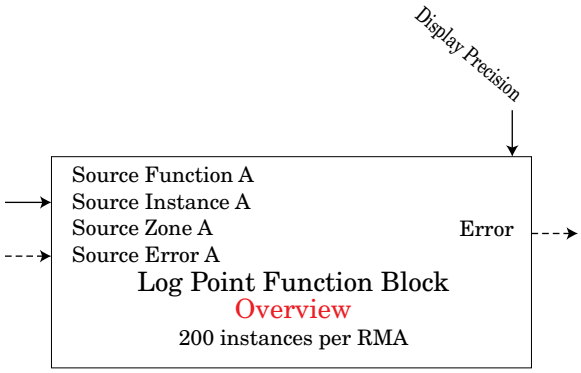
dLog Data Logging Menu
oPEr Operation Page

- STAt Status : OK, No Memory, Paused
- AMnE Available Logging Memory : 0 to 9,999 Megabytes
- At i Available Logging Time : 0 to 9,999 hours

Logging Point Function

Assign data points to log using Log Point Function Block. Use Data Logging Function Block to start and stop data logging to memory. The file format stored on the SD card is comma delimited. If data point is not accessible, data point is recorded as 'stale'.

Error: None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, Fail, Math Error, Not Sourced, Stale



dLog Data Logging Menu
SEt Setup Page

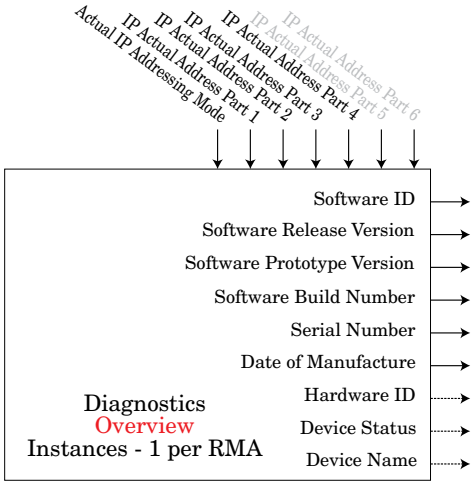
- SFnA Source Function A : None, Analog Input, Current, Cool Power, Heat Power, Power, Linearization, Math, Process Value, Set Point Closed, Set Point Open, Variable, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Limit, Logic, Special Function Output 1 to 4, Timer
- S iA Source Instance A : 1 to 24
- S2ZA Source Zone A : 0 to 16
- PErd Display Precision : Source, Whole, Tenths, Hundredths, Thousandths

Diagnostics Function

Device Name : EZ-ZONE RM

Device Status : OK, Fail

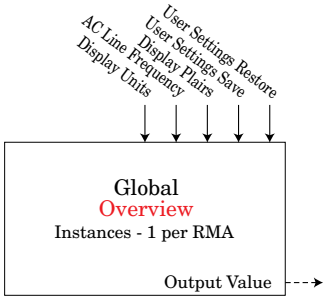
Hardware ID : 25 (RMA)



d iAG Diagnostics Menu
FAct Factory Page

- S.id Software ID : 0, 1, 2, ...
- S.rL Software Release Version : 1.0, 2.0, 3.0, ...
- S.Pr Software Prototype Version : 1
- S.bLd Software Build Number : 0 to 999
- Sn Serial Number : xxxxxx
- dAtE Date of Manufacture : YWW format
- iP.AC Actual IP Addressing Mode : None, Fixed IP Address, DHCP, Fail
- iP.A1 IP Actual Address Part 1 : xxx
- iP.A2 IP Actual Address Part 2 : xxx
- iP.A3 IP Actual Address Part 3 : xxx
- iP.A4 IP Actual Address Part 4 : xxx
- iP.A5 IP Actual Address Part 5 : xxx
- iP.A6 IP Actual Address Part 6 : xxx

Global Function

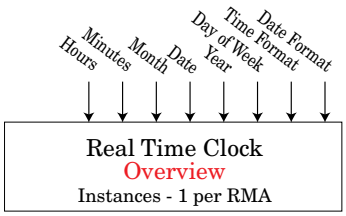


GLbL Global Menu
SEt Setup Page

- C_F Display Units : F, C
- AC.LF AC Line Frequency : 50 Hz, 60 Hz
- dPr5 Display Pairs : 1 to 10
- USr.S User Settings Save : None, User Set 1, User Set 2
- USr.r User Settings Restore : None, User Set 1, User Set 2, Factory

Real Time Clock Function

The RTC allows profiles to pause until a given amount time elapses or a given date occurs. It also allows for a date and time stamp when data logging.



rtC Real Time Clock Menu
SEt Setup Page

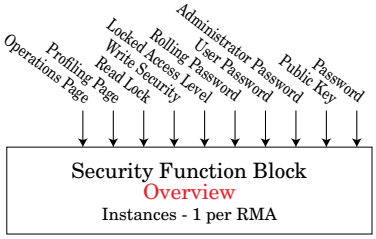
- hour Hour : 0 to 23
- Min Minutes : 0 to 59
- Mon Month : 1 to 12
- dAtE Date : 1 to 31
- YEAr Year : 2008 to 2100
- dOW Day of Week : Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday
- t.For Time Format : HH:MM, HH:MM:SS
- d.For Date Format : MM/DD/YYYY, DD/MM/YYYY

Security Function

If Password is enabled, the user must enter the Password to get to menus that have been blocked due to lock level settings. Rolling passwords required a new password each time the power has been cycled to the controller. It will be different for every controller. The administrator password is required to change the security settings even if the user enters their password to override the security settings.

Note:

Set on a Zone by Zone basis. This is independent of the RUI Security Setting.



LoC Lock Menu
FAct Factory Page

- LoC.o Operations Page : 1 to 3
- LoC.P Profiling Page : 1 to 3
- PASE Password Enable : Off, On
- r.LoC Read Lock : 1 to 5
- S.LoC Write Security : 1 to 5
- LoCL Locked Access Level : 1 to 5
- roLL Rolling Password : Off, On
- PAS.u User Password : 10 to 999
- PAS.A Administrator Password : 10 to 999

ULoC Unlock Menu
FAct Factory Page

- CodE Public Key : xxx
- PASS Password : xxx

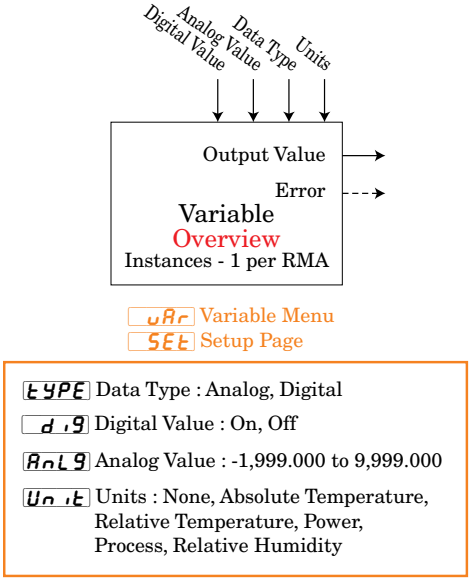
Variable Function

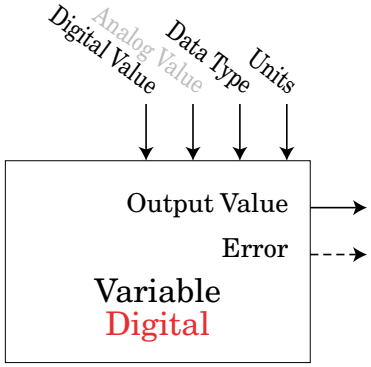
Ranges specified in units or degrees F if expressed in degrees C, range is smaller

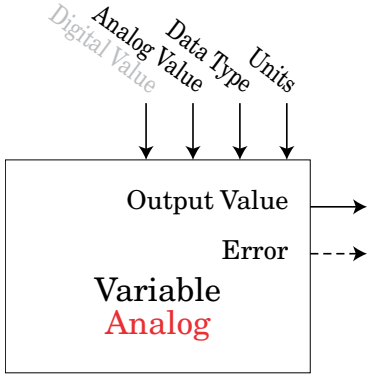
Error: None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale

Function passes stored value to output.

o.u Output value: -1,999000 to 9,999.000 or On, Off







7 Chapter 7: RMA Communications

EZ-ZONE RMA & Communications

With the introduction of the first Programmable Logic Controllers (PLC's) in the early to mid 1970's it quickly became apparent that there was a need to communicate between one PLC and another, and then on a wider scale, between PLC's and other computers within the company infrastructure. Some of those needs involved applications with interlinking processes, such as batch processes or assembly lines utilizing multiple controls that required better synchronization and control.

Over time, the scope of the requirements for industrial communications broadened and became better defined, with specific needs being addressed. Those requirements and specifications centered on collecting data, configuring controls, and controlling a process.

Protocols

The Protocol describes how to exchange data. Due to the volume of traffic (limited bandwidth) and sensitivity to disturbances on the network the protocol will define the number of bits in a packet of information, the speed of the data transfer, whether or not error checking is done, etc... There are a number of different data communications protocols in use today. The EZ-ZONE RMA module can be optionally equipped with the following protocols:

- Modbus® RTU & TCP
- Profibus® DP
- EtherNet/IP™
- DeviceNet™

Each of these protocols are heavily in use today within a wide array of industrial applications.

Modbus

Introduction to the Modbus Protocol

Gould Modicon, now called AEG Schneider, first created the protocol referred to as "Modbus RTU" used in process control systems. Modbus provides the advantage of being extremely reliable in exchanging information, a highly desirable feature for industrial data communications. This protocol works on the principle of packet exchanges. The packet contains the address of the controller to receive the information, a command field that says what is to be done with the information, and several fields of data. Each RM module User's Guide has a comprehensive listing of these registers found in the Operations, Setup, Profiling, and Factory Pages.

Many parameter values within the various RM modules are four bytes in length and require two Modbus registers. By default, the low order word contains the two lower bytes of the 32 bit parameter and the high register number contains the two higher bytes. If it makes your programming easier you may reverse this Modbus default when using RM modules where the low register number contains the two higher bytes and the high register number contains the two lower bytes. This setting can be modified in the RM Access Setup pages under the Communications [CoM] Menu.

If it is desired to acquire more information on Modbus RTU or Modbus TCP direct your browser to: http://www.modbus.org.

User Programmable Memory Blocks

The RMA module equipped with the Modbus protocol features a block of 40 contiguous Modbus registers that can be configured by the user to reflect the parameters of their choice. This assembly allows for direct read/write (depending on actual parameter) access in one contiguous block. When the RMA is used in conjunction with other RM modules it is important to know the assembly sizes for each. The list below reflects the size for each module as of this revision.

- RMC (Control) equals 40 members
- RME (Expansion) equals 40 members
- RMA equals 40 members
- RMH (High Density) equals 80 members
- RML (Limit) equals 80 members
- RMS (Scanner) equals 80 members

To acquire a better understanding of the tables found in the back of this guide please read through the text below which defines the column headers used. (See Appendix: Modbus Programmable Memory Blocks)

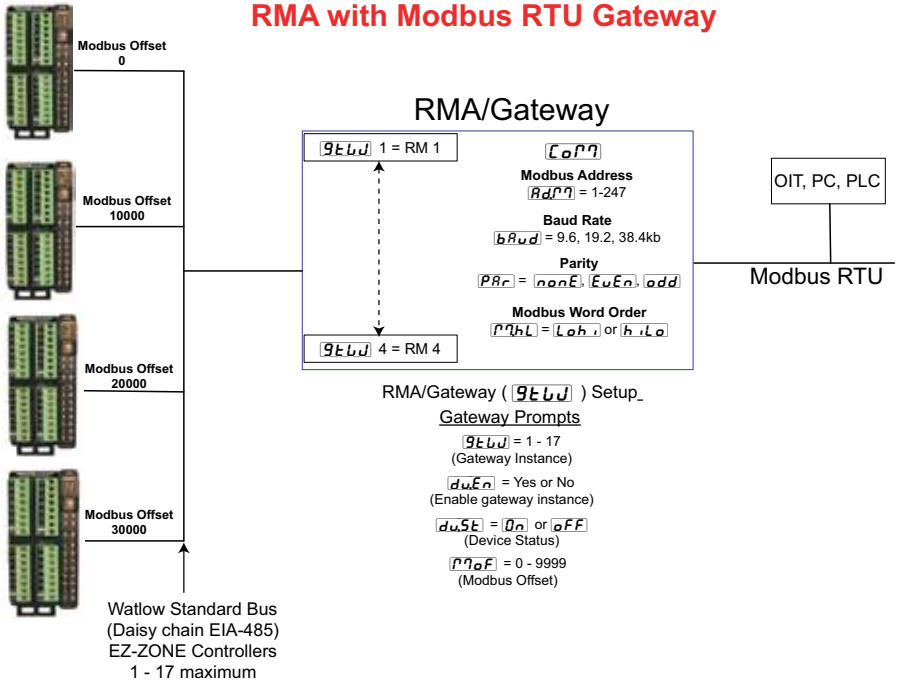
Assembly Definition Addresses

Fixed addresses used to define the parameter that will be stored in the "Assembly Working Addresses"; may also be referred to as a pointer. The value stored in these addresses will reflect (point to) the Modbus address of a parameter within an RM module.

Assembly Working Addresses

Fixed addresses directly related to their associated "Assembly Definition Addresses" (e.g., Working Addresses 200 & 201 will assume the parameter pointed to by definition addresses 40 & 41). Take a look at the section entitled "Modbus Default Assembly Structure 40-119" found in the Appendix. The RMC assembly can be seen where the first member is identified as "Control Loop Set Point 1". This is a writable

parameter, therefore, within the user program when writing a new value to Modbus registers 200 and 201 the RMC loop 1 Closed Loop Set Point will change accordingly. So, when the Modbus address of a target parameter is stored in an "Assembly Definition Address" its corresponding working address will return that parameter's actual value. If it's a writable parameter, as in the case described above, writing to its working registers will change the parameters actual value.



Using Modbus RTU

Configuring the Gateway

If using and RUI, reference the graphic below as an example, and follow the steps provided to configure the Modbus communication port as well as each gateway instance (RM Module).

Communications Port Settings:

Starting from the RUI Home Page.

1. Push and hold the up and down arrow keys on the front panel for six seconds to go the the Setup Menu.
2. Push the up or down arrow key until (Communications Menu) appears in the upper display and in the lower display.
3. Push the green Advance Key to enter the Communications Menu. The upper display shows the current Modbus address (, factory default) and the lower display shows the address prompt .
4. Push the up arrow key until the chosen address appears in the upper display.
5. Push the green Advance Key to change the baud rate. The upper display shows , and the lower display shows . Use the up and or down arrow key to change the baud rate.
6. Push the Advance Key to view the current parity setting. The upper display shows and lower display shows . If desired, use the up and or down arrow key to change the parity.
7. Push the Advance Key to view the Modbus TCP Word Order, which allows the user to swap the high and low order 16-bit values of a 32 bit member.. The factory default is low/high as shown in the upper display and the lower display shows the byte order prompt .
8. Push the Advance Key to view the current units as passed between gateway devices and the master on the network. The upper display shows and lower display shows . If desired, use the up and or down arrow key to change the units.
9. Lastly, push the Advance Key to view whether or not parameters written from the master device (typically a PLC) will be saved in the slave (RM module). The upper display shows or and lower display shows the non-volatile save prompt . If desired, use the up and or down arrow key to change the from yes to no.
10. Push the Infinity Key three times or push and hold for approximately 3 seconds to navigate back to the Home Page.

Gateway Settings:

Starting from the RUI Home Page.

1. Push and hold the up and down arrow keys on

the front panel for six seconds to go the the Setup Menu.

2. Push the up or down arrow key until [gtwy] (Gateway Menu) appears in the upper display and [SEt] in the lower display.
3. Push the green Advance Key to begin configuration of the first gateway instance (RM module zone 1). The upper display shows instance one [1] and the lower display shows the gateway prompt [gtwy].
4. Push the green Advance Key once where the upper display indicates [no] as the default and the lower display shows the enable/disable prompt [d.En].
6. Push the Advance Key to view the current status of this instance. The upper display will show either [`off] or [``on] depending on whether or not a successful link has been established between gateway and slave device. This is a read only prompt.
7. Push the Advance Key to view the current Modbus offset where the upper display will show zero [0] as a default and the lower display show the Modbus Offset prompt [rM.oF]. If desired, use the up arrow key to change the offset.
8. Push the Infinity Key three times or push it and hold for approximately 3 seconds to navigate back to the Home Page.

Communications To/From a Master:

After configuring the gateway in order to read or write the expected parameter from the expected module the Modbus Offset prompt [rM.oF] is most significant. This parameter provides an offset for the purpose of module selection while at the same time providing the ability to read and or write to any given Modbus register.

As an example, lets assume the offsets are as shown in the graphic on the previous page (RMA with Modbus RTU Gateway) and the Master wants to read instance one Closed Loop Set Point from both RM module address 1 and 4. Open up the associated RM User's Guide, turn to the Operations Page and look in the Loop Menu for Closed Loop Set Point. To read instance one Closed Loop Set Point from RM module address 1 the appropriate absolute Modbus address would be:

2500 + 400001 + Modbus offset (0) = 402501.

Notice that there is no offset applied in this example. To read the Closed Loop Set Point from RM module address 4 the absolute address would now be:

2500 + 400001 + Modbus offset (30000) = 432501.

As can be seen in this example, the Modbus Offset defines the module (RM 4) where the specific Modbus address for the parameter in question does not change. The values given for the Modbus Offset [rM.oF] prompt also determine the available Modbus addresses for each module. Looking at the graphic on the previous page, the following Modbus addresses would be available for each module:

RM 1, 400,001 - 410,000
RM 2, 410,001 - 420,000
RM 3, 420,001 - 430,000
RM 4, 430,001 - 440,000

Note:

The Modbus Offset [rM.oF] as modified through the RUI cannot exceed 9999. Therefore, if it is desired to utilize a Modbus offset as shown in the previous graphic (above 9999) it must be entered using EZ-ZONE Configurator software. This software can be downloaded free of charge from the Watlow web site: http://www.watlow.com/products/software/zone_config.cfm

Default RMA Communication Parameters (Modbus RTU)

If your model number has a two in the identified placeholder (RMA x - x [**2**] x x - x x x x) then these defaults apply.

Address ([Ad.rM]) = [1]

Baud Rate ([bAUd]) = [9600]

Parity ([PAr]) = [nonE]

Word Order [rM.hL]) = [Loh ,]

Modbus Units ([C_F]) = [F]

Non-volatile Save ([nU.S]) = [YES]

Using an RUI, change or view the RMA communication defaults by following the steps below:

1. Push and hold the up and down arrow keys on the front panel for six seconds to go the the Set-up Menu.
2. Push the up or down arrow key until [CoM] (Communications Menu) appears in upper display and [SEt] in the lower display.
3. Push the green Advance Key to enter the Communications Menu. The upper display shows [1], and the lower display shows [Ad.rM].
4. Push the up arrow key to change the Modbus address.
5. Push the green Advance Key to change the baud rate. The upper display shows [9600], and the lower display shows [bAUd]. Use the up or down arrow key to change the baud rate.
6. Push the Advance Key to change parity. The upper display shows [nonE] and lower display shows [PAr]. Use the up or down arrow key to change the parity.
7. Push the Advance Key to change the Modbus TCP Word Order, which allows the user to swap the high and low order 16 bit values of a 32 bit member. The upper display shows [Loh ,] and lower display shows [rM.hL]. Use the up or down arrow key to change the word order.
8. Push the Advance Key to change the tem-

perature units. The upper display shows [F] and lower display shows [C_F]. Use the up or down arrow key to change the temperature units.

9. Push the Advance Key to change the Non-volatile Save setting. The upper display shows [YES] and lower display shows [nUS]. Use the up or down arrow key to change the Non-volatile Save setting.
10. Push the Infinity Key three times or push and hold for approximately 3 seconds to navigate back to the Home Page.

Ethernet Communications

Using Modbus TCP

Communications To/From a Master:

When Modbus TCP is enabled there are Modbus related prompts (violet as shown in the following graphic) that need to be addressed. They are:

1. Modbus TCP Enable [MbE], turns Modbus on or off.
2. Modbus TCP Word Order [MhL], which allows the user to swap the high and low order 16 bit values of a 32 bit member.
3. Modbus TCP Offset [MoF], which defines each of the available Modbus registers for each gate way instance as well as the parameter. For further information on this prompt see the section on the previous page entitled "Communications To/From a Master".

Common Industrial Protocol (CIP)

Introduction to CIP

With the introduction of CIP a user can now collect data, configure a device and control industrial devices. CIP is an open protocol at the application layer fully managed by the Open DeviceNet Vendors Association (ODVA, http://www.odva.org). Being that this is an open protocol there are many independent vendors offering a wide array of devices to the end user. CIP provides the ability to communicate utilizing both implicit messaging (real-time I/O messaging), and explicit messaging (information/configuration messaging). For implicit communications using a PLC simply configure the module (RMA) assembly size into the I/O structure of the PLC (See: CIP Implicit Assemblies). The assembly structure can also be changed by the user.

Explicit communications requires the use of specific addressing information. DeviceNet requires that the node address be specified where EtherNet/IP requires just the Class, Instance and Attribute.

- Node address or MAC ID (0 - 63, DeviceNet only)
- Class ID (1 to 255)
- Instance ID (0 to 255)
- Attribute ID (1 to 255)

EtherNet/IP and DeviceNet are both based on CIP. EtherNet/IP (Industrial Protocol) is a network communication standard capable of handling large amounts of data at speeds of 10 Mbps or 100 Mbps, and at up to 1,500 bytes per packet. It makes use of standard off-the-shelf Ethernet chip sets and the currently installed physical media (hardware connections). DeviceNet was the first field bus offering of the ODVA group and has been around for many years. DeviceNet can communicate at 125, 250 and 500 kilobytes per second with a maximum limitation of 64 nodes (0 to 63) on the network. The RMA module equipped with Ethernet and DeviceNet hardware supports implicit and unconnected explicit messages. To enable Ethernet communications with legacy Allen-Bradley PLCs the Ethernet card also supports the PCCC protocol.

CIP Implicit Assemblies

Communications using CIP (EtherNet/IP and DeviceNet) can be accomplished with any RM module using the RMA. As was already mentioned, reading or writing when using CIP can be accomplished via explicit and or implicit communications. Explicit communications is usually executed via a message instruction within the PLC but there are other ways to do this as well outside of the focus of this document.

Implicit communications is also commonly referred to as polled communications. When using implicit communications there is an I/O assembly that would be read or written to. The default assemblies and the assembly size is embedded into the firmware of the specific module in use and they can be different from module to module. Watlow refers to these assemblies as the T to O (Target to Originator) and the O to T (Originator to Target) assemblies where the Target is always the EZ-ZONE controller and the Originator is the PLC or master on the network. There is also a common industry reference to these assemblies that may be encountered For most RM modules the O to T assembly is made up of 40 (32-bit) members where the T to O consists of 41 (32-bit) members. All assembly members are user configurable with the exception of the first T to O member. The first member of the T to O assembly is called the Device Status, it is unique to the RMA and cannot be changed. Bits 16 - 31 of this 32-bit word represents the communications status of the RM modules (zones) on the Standard Bus side of the RMA when enabled. Once a Zone is enabled, valid communications will be represented with the bit set to a "1", if set to "0", the RMA is not communicating with the zone. Bit 16 represents Zone 1 where bit 31 represents Zone 16. The 40 members that follow Device Status are user configurable. The Appendix of this User's Guide contains the assemblies for each of the RM modules (See Appendix: CIP Implicit Assembly Structure by product).

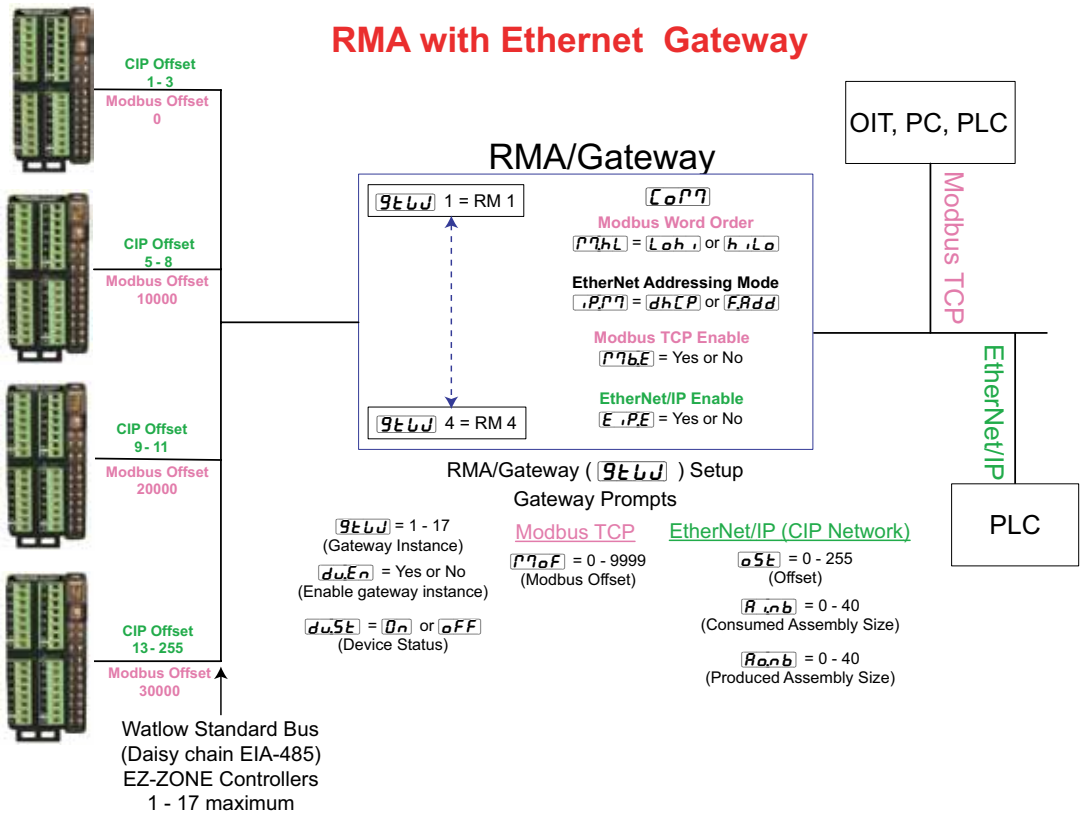
Compact Implicit Assembly Class

Along with the standard implicit assembly where each module parameter (member) occupies one 32-

bit assembly member there is also a Compact Class of the assembly. The need for the Compact Class of assembly members became apparent as the high density RM modules (up to 16 control loops) were being developed. The Compact Class allows for better utilization of each bit within an assembly member by compacting parameters within one 32-bit assembly member. As an example, if a standard assembly member were configured as a Variable just 7 bits out of the 32 will be used to write an off (62) or on (63) status to the module. With the Variable Compact Class in use, 16 Variables can be placed in one 32-bit assembly member using just 2 bits for each (00 = off, 01 = on). There is a variety of predefined Compact Class members that can be used (See Appendix: CIP Compact Class Assemblies) to modify the default implicit assemblies.

Note:

When changing the implicit assembly of any given RM module through the RMA, ensure that the CIP Instance Offset is added to the documented instance for any given parameter as well as the assembly instance. As an example, if it were desired to do the above operation on RM 3 in the DeviceNet graphic the value to write would now be 0x6A, 0x09 and 0x01 (Class, Instance and Attribute respectively) to 0x77, 0x09 and 0x0E. Notice that the CIP Offset was added to each.



Modifying Implicit Assembly Members

To change any given member of either assembly (T to O or O to T) simply write the new class, instance and attribute to the member location of choice. As an example, if it were desired to change the 14th member of the O to T assembly of an EZ-ZONE RMH module from the default parameter (none specified) to Digital Output State (see RMH User's Guide, Operations Page, Digital Input/Output Menu) write the value of 0x6A, 0x01 and 0x07 (Class, Instance and Attribute respectively) to 0x77, 0x01 and 0x0E. Once the change is executed, reading this member location will return either an on (63) or off (62) state. This operation to modify the assembly would be the same if using one of the given Compact Class members discussed above.

Using EtherNet/IP™

Communications To/From Third Party Device:

When using the EtherNet/IP protocol, there are two methods used in communicating, implicitly (See: CIP Implicit Assemblies) and explicitly. Once the gateway instance is enabled there are two prompts that relate directly to these forms of communication.

Reference the graphic above (RMA with Ethernet Gateway) along with the green prompts when reading the descriptions that follow below.

oSt CIP Offset, used exclusively with explicit messages where this prompt defines the parameter instance as well as the module on the network. The CIP offset is unique to each gateway instance (RM module) and should not overlap from one gateway instance to another.

Application Note:

Assume that in the following graphic there are 4 RMC modules on the network with each having 4 instances of an Analog Input. If it is desired to access all of the Analog Inputs from each module the CIP offset must, at a minimum, have an offset of 4 between each module (gateway instance). If the offset for each module is set as shown on the following page, the 4th instance would not be available. As another example, looking at the RMC User's Guide in the Setup Page under the Variable Menu, it shows that there are 8 instances available. If all 8 for each module are to be made available to the Master (OIT, PC, PLC) then the offsets should at a minimum be set as shown below: RM1 = 0, RM2 = 9, RM3 = 18 and RM4 = 27

Using the RMC User's Guide look at the Operations Page and then the Analog Input Menu. There you will find the class, instance and attribute of the first instance of the Analog Input Value for RM 2 to be the following:

Class = 104 or (0x68)
Instance = 5
Attribute = 1

This information would be needed to execute an explicit message to read this parameter. Notice that the instance above is identified as 5 and not 1 as listed in the RMC documentation. The CIP offset is always added to the documented instance. Using the following graphic the offset entries are listed below.

1. RUI prompt entry for gateway instance 1 (RM 1) follows: oSt = 0

RUI prompt entry for gateway instance 2 (RM 2) follows: oSt = 4

RUI prompt entry for gateway instance 3 (RM 3) follows: oSt = 8

RUI prompt entry for gateway instance 4 (RM 4) follows: oSt = 12

Likewise, to read the Analog Input Value *instance 2* of RM 4 the following information would need to be entered in the message instruction:

Class = 104 or (0x68)
Instance = 14 or (0x0E)
Attribute = 1

Ao.nb CIP Implicit Output (Produced) Assembly Size, used exclusively when communicating implicitly. For any given RMA gateway instance (1 - 17), the output assembly size will never be greater than 40, 32 bit members. The user entry ranges from 0 to 40.

A .nb CIP Implicit Input (Consumed) Assembly Size, used exclusively when communicating implicitly. For any given RMA gateway instance (1 - 17), the input assembly size will never be greater than 40, 32 bit members. The user entry ranges from 0 to 40.

Note:

When configuring the RMA assemblies for each gateway instance it is important to note that the maximum number of implicit input/output members using EtherNet/IP cannot exceed 100. A network could have up to 5 EZ-ZONE controllers with 20 members each maximum or the 100 members can be divided any way the user would like as long as 40 I/O members per module are not exceeded.

Using the graphic above as an example, if:

9tUJ instance 1 has A .nb and Ao.nb set to 5

9tUJ instance 2 has A .nb and Ao.nb set to 5

9tUJ instance 3 has A .nb and Ao.nb set to 5

9tUJ instance 4 has A .nb and Ao.nb set to 5

Each of the four RM modules will contain the first 5 members of the I/O assembly and this information would then be passed implicitly to the Master on the EtherNet/IP network.

Note:

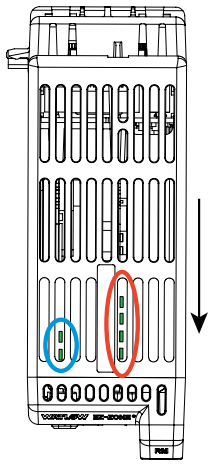
In the above graphic there are several prompts omitted for the sake of saving some space. When the Ethernet addressing mode is set to Fixed the user will find several more prompts that will follow the prompts shown for "Ethernet Addressing Mode" related to specifying the actual IP IP.F 1 - IP.F4, subnet IP.S 1 - IP.S4 and the gateway IP.g 1 - IP.g4 (external gateway) addresses. If set to receive an IP address from a host dhCP computer, the prompts shown are accurate.

Note:

When changing the RMA IP address, power must be cycled for the new address to take affect.

Ethernet Indicator LED's

The RMA has four indicator LED's on the top of the module for Ethernet, two of which are not used for Modbus TCP. The Module Status and Network Status LED's apply only when EtherNet/IP is enabled. The characteristics of the Activity and Link indicator LED's are defined in the Ethernet specification.



This is a view of the RMA module looking down into the top where the arrow is pointing towards the front of the module.

Left Front (blue circle):
- Green accessing SD card.
- Red accessing internal memory

Left Rear (blue circle):
- Flashing green heartbeat
- Red boot loader activity

Right, from front to rear (red circle):
- Active Status - Ethernet
- Link Status - Ethernet
- MS (Module Status - CIP)
- NS (Network Status - CIP)

Link Status Indicator		
Steady Off	Not powered, unknown link speed	If the device cannot determine link speed or power is off, the network status indicator shall be steady off.
Red	Link speed = 10 Mbit	If the device is communicating at 10 Mbit, the link LED will be red..
Green	Link speed = 100 Mbit	If the device is communicating at 100 Mbit, the link LED will be green.

Activity Status Indicator		
Flashing Green	Detects activity	If the MAC detects activity, the LED will be flashing green.
Red	Link speed = 10Mbit	If the MAC detects a collision, the LED will be red.

EtherNet/IP Indicator LED's.

Module Status Indicator		
Indicator State	**Summary**	**Requirement**
Steady Off	No power	If no power is supplied to the device, the module status indicator shall be steady off.
Steady Green	Device operational	If the device is operating correctly, the module status indicator shall be steady green.
Flashing Green	Standby	If the device has not been configured, the module status indicator shall be flashing green.
Flashing Red	Minor fault	If the device has detected a recoverable minor fault, the module status indicator shall be flashing red. NOTE: An incorrect or inconsistent configuration would be considered a minor fault.
Steady Red	Major fault	If the device has detected a non-recoverable major fault, the module status indicator shall be steady red.
Flashing Green / Red	Self-test	While the device is performing its power up testing, the module status indicator shall be flashing green / red.

Network Status Indicator		
Indicator State	**Summary**	**Requirement**
Steady Off	Not powered, no IP address	If the device does not have an IP address (or is powered off), the network status indicator shall be steady off.
Flashing Green	No connections	If the device has no established connections, but has obtained an IP address, the network status indicator shall be flashing green.
Steady Green	Connected	If the device has at least one established connection (even to the Message Router), the network status indicator shall be steady green.
Flashing Red	Connection timeout	If one or more of the connections in which this device is the target has timed out, the network status indicator shall be flashing red. This shall be left only if all timed out connections are re-established or if the device is reset.
Steady Red	Duplicate IP	If the device has detected that its IP address is already in use, the network status indicator shall be steady red.
Flashing Green / Red	Self-test	While the device is performing its power up testing, the network status indicator shall be flashing green / red.

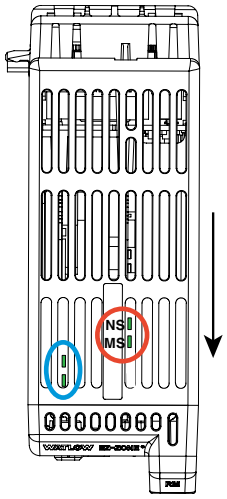
Using DeviceNet™

Communications To/From Third Party Device:

Like EtherNet/IP when using the DeviceNet™ protocol, there are two methods used in communicating, implicitly (See: CIP Implicit Assemblies) and explicitly. Because DeviceNet and Ethernet/IP both use CIP, the communications examples discussed above apply here as well. To acquire a better understanding of DeviceNet communications substitute DeviceNet for EtherNet/IP and review the section entitled "Using EtherNet/IP, Communications To/From a Third Party Device".

DevceNet Indicator LED's

The RMA has four indicator LEDs on the top of the module, two of which (rear two) are used for DeviceNet (Module Status and Network Status). The characteristics of these two LEDs is established by the Open DeviceNet Vendors Association (ODVA, http://www.odva.org)



This is a view of the RMA module is looking down into the top where the arrow is pointing towards the front of the module.

Left Front (blue circle):
- Green accessing SD card.
- Red accessing internal memory

Left Rear (blue circle):
- Flashing green heartbeat
- Red boot loader activity

Right, from front to rear (red circle):
- MS (Module Status - CIP)
- NS (Network Status - CIP)

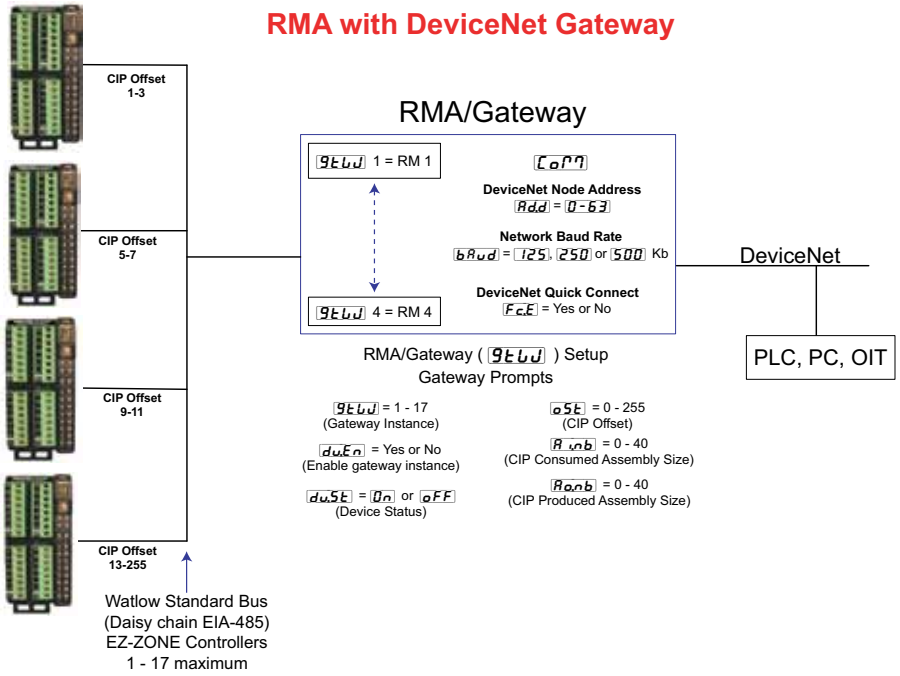
Module Status (MOD)	
Indicator LED	**Description**
Off	No power is applied to the device.
Flashing Green-Red	The device is performing a self-test.
Flashing Red	Major Recoverable Fault.
Red	Major Unrecoverable Fault.
Green	The device is operating normally.

Setting DeviceNet Communication Parameters from the RUI Front Panel

Valid DeviceNet node addresses range from 0 - 63 and there are three available baud rates (network speed) for the user to choose from: 125Kb, 250Kb, or 500Kb. The EZ-ZONE RMA factory defaults are listed below:

Node address = 63, Baud rate = 125Kb

If the node address needs to be changed, go to the RMA "Setup Page" following the steps below:



Network Status (NET)	
Indicator LED	**Description**
Off	The device is not online. The device has not completed the duplicate MAC ID test yet. The device may not be powered..
Green	The device is online and has connections in the established state. For a Group 2 Only device it means that the device is allocated to a Master.
Red	Failed communication device. The device has detected an error that has rendered it incapable of communicating on the network (duplicate MAC ID or Bus-off).
Flashing Green	The device is online, but no connection has been allocated or an explicit connection has timed out.
Flashing Red	A poll connection has timed out.

1. Push and hold the up and down arrow keys on the front of the RUI for six seconds to go the Setup Menu.
2. If not already visible push the up or down arrow key until comm (Communications Menu) appears in upper display and SEt in the lower display.
3. Push the green Advance Key to enter the Communications Menu where the lower display shows Add and the top display shows the current DeviceNet node address.
4. Push the up or down arrow to change the DeviceNet node address.
5. Push the green Advance Key once to change the baud rate where the lower display shows bAud and the top display shows the current DeviceNet baud rate.
6. Push the up or down arrow to change to the desired baud rate (125Kb, 250Kb, or 500Kb)
7. Push the green Advance Key once to enable/disable the DeviceNet quick connect feature. The lower display shows FCE and the top display will show no or YES based on the current setting.

8. Push the up or down arrow key to enable or disable the quick connect feature.
9. Push the green Advance key once to change the temperature units passed over DeviceNet where the lower display shows [C_F] and the top display will show [F] or [C] based on the current setting.
10. Push the up or down arrow to change to the temperature units.
11. Push the Infinity Key three times or push and hold for approximately 3 seconds to navigate back to the Home Page.

There are three prompts delivered to the user from the RUI when attached to the RMA that are related to DeviceNet. Two of which are defined above, [bAud] (network baud rate or speed) and [Add] (network node address). There is one other which is identified and explained below:

[FCnE] (Quick Connect)

The Quick Connect feature is an option enabled on a node-by-node basis. When enabled, a device transitions to the on-line state concurrently with sending the first Duplicate MACID request message. The device is still required to execute the network State Tranisition Diagram (STD, used to describe object behavior), including going offline anytime a Duplicate MACID response message is received.

Note:

Although this feature allows a device to begin communicating on the network faster, it is at the expense of a delay in the duplicate node detection algorithm. It is left up to the user to guarantee that no nodes exist with the same MAC ID and that no more than one client device is configured to access the same device using the predefined Master/Slave connection set. Bus errors may occur if either of these conditions exists. This feature is enabled within a device through a non-volatile attribute in the DeviceNet object. A device shall have this feature disabled (attribute set to '0') as the factory default.

Once the above parameters have been changed cycle power on the DeviceNet network for the new parameters to take affect.

Profibus DP

Introduction to Profibus DP

Profibus was created by the German government in the late 80's due to industrial automation demand. Profibus DP (Decentralized Periphery) is a serial communications fieldbus using EIA-485 as the physical layer and is in accordance with the European Electrical Specification EN50170.

Profibus DP uses a master slave network configuration where RM modules equipped with this protocol serve as the slave. The RMA equipped with the Profibus DP protocol supports cyclic (DP-V0) and acyclic (DP-V1) communications. For your reference, cyclic communications implies that a set of defined parameters (user configured as it relates to the RMA) are periodically read and or written. The frequency or period of the read/write operations is determined (setup) via the master on the network. You can configure the cyclic parameter set by installing the software (Profibus GSD Editor for EZ-ZONE Products) which can be found on the CD that came with the product (Controller Support Tools) or by clicking on the link below where it can be downloaded free of charge, point your browser to: http://www.watlow.com/literature/pti_search.cfm?dltype=4

Once the GSD (Generic Station Description) file is created, simply upload it to the master device.

Acyclic communications will read and or write data on demand and is based on the Slot Offset (as defined in the RMA configuration) and the specific parameter index (as can be found in the menus of the modules User's Guide). Most of the discussion that follows is related to acyclic communications.

As with all of the other available protocols, prior to establishing communications between master and the slave the gateway instance must first be enabled [duEn]. Once enabled, the user must define the Slot Offsets for each enabled EZ-ZONE controller.

Use the graphic below (RUI being used as a Profibus DP Gateway) in reference to the descriptions that follow below.

[SoF] Slot Offsets are used exclusively with acyclic (DP-V1) communications and define the individual EZ-ZONE controller on the network as well as the instance of the parameter to be read or written to. The offset defaults are as shown in the graphic in increments of 20, however, they can be changed based on user needs.

As an example, when programming the master device ensure that the Slot Offset and the Profibus Index (found in each product User's Guide in the various menus) are defined. To read the first instance of the Analog Input Value in RM 2 use the following information when programming the Master:

Slot Offset = 20
Index = 0 (See the EZ-ZONE RMC User's Guide, Operations Page under the Analog Input Menu)

Note that RM 2 and instance 1 is identified in the Slot Offset where the parameter, in this case, Analog Input Value 1 is identified via the Profibus Index. If it were instance 2 of the same parameter that was needed the Slot Offset would change to 21. Likewise, to read the Analog Input Value instance 2 of RM 4 the following information would need to be entered when programming the Master:

Slot Offset = 61
Index = 0

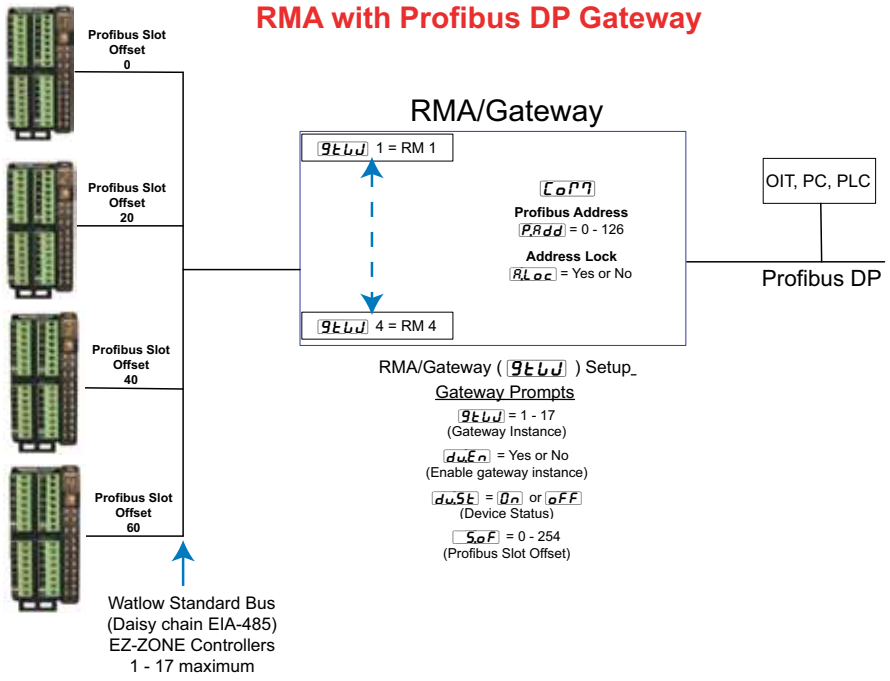
Profibus DP RMA LED Indicators

Viewing the unit from the front and then looking on top of the RMA two bicolor LED's can be seen where only the front one is used. Definition follows:

Closest to the Front

Indicator LED	Description
Red	Profibus network not detected
Red Flashing	Indicates that the Profibus card is waiting for data exchange.
Green	Data exchange mode

To learn more about Profibus point your browser to http://www.profibus.org.



Saving Settings to Non-volatile Memory

Any changes made from the RUI are always saved to non-volatile memory (EEPROM) of the module it is connected to. If a module loses power or is switched off, its settings will be restored when power is reapplied.

The EEPROM has a limited life calculated to be approximately 1,000,000 writes. Over the life of any given RM module this limitation would not be a problem when changes are made exclusively from the RUI. However, if an RM module is receiving instructions from a PLC or a computer through a network connection where the frequency of the write operations could be high, the EEPROM life could expire much quicker.

By default, settings made through the network are not saved to nonvolatile memory (59). However, as stated above, changes made via the RUI are saved to EEPROM, regardless of the setting of non-volatile memory save. This parameter can be changed via the communications network in use, through the RUI or via EZ-ZONE Configurator software. This parameter can be found in the User's Guide for each RM module in the Setup Page under the Communications Menu.

Note:

This setting must be changed to the desired setting for each module individually.

Chapter 8: Appendix

Modbus - User Programmable Memory Blocks

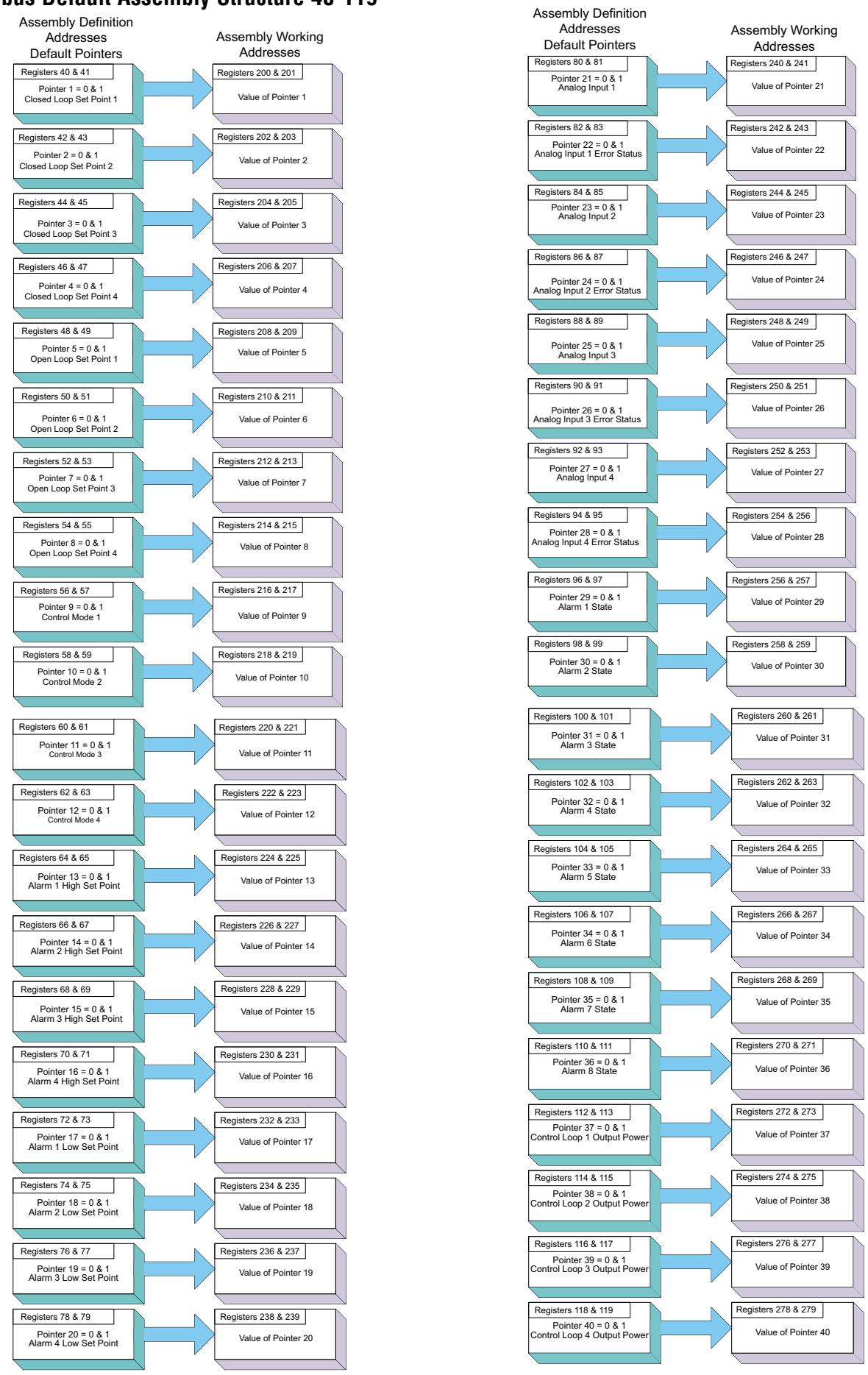
Assembly Definition Address and Assembly Working Addresses

Definition Addresses	Working Addresses		Definition Addresses	Working Addresses
40 & 41	200 & 201		120 & 121	280 & 281
42 & 43	202 & 203		122 & 123	282 & 283
44 & 45	204 & 205		124 & 125	284 & 285
46 & 47	206 & 207		126 & 127	286 & 287
48 & 49	208 & 209		128 & 129	288 & 289
50 & 51	210 & 211		130 & 131	290 & 291
52 & 53	212 & 213		132 & 133	292 & 293
54 & 55	214 & 215		134 & 135	294 & 295
56 & 57	216 & 217		136 & 137	296 & 297
58 & 59	218 & 219		138 & 139	296 & 299
60 & 61	220 & 221		140 & 141	300 & 301
62 & 63	222 & 223		142 & 143	302 & 303
64 & 65	224 & 225		144 & 145	304 & 305
66 & 67	226 & 227		146 & 147	306 & 307
68 & 69	228 & 229		148 & 149	308 & 309
70 & 71	230 & 231		150 & 151	310 & 311
72 & 73	232 & 233		152 & 153	312 & 313
74 & 75	234 & 235		154 & 155	314 & 315
76 & 77	236 & 237		156 & 157	316 & 317
78 & 79	238 & 239		158 & 159	318 & 319
80 & 81	240 & 241		160 & 161	320 & 321
82 & 83	242 & 243		162 & 163	322 & 323
84 & 85	244 & 245		164 & 165	324 & 325
86 & 87	246 & 247		166 & 167	326 & 327
88 & 89	248 & 249		168 & 169	328 & 329
90 & 91	250 & 251		170 & 171	330 & 331
92 & 93	252 & 253		172 & 173	332 & 333
94 & 95	254 & 255		174 & 175	334 & 335
96 & 97	256 & 257		176 & 177	336 & 337
98 & 99	256 & 259		178 & 179	338 & 339
100 & 101	260 & 261		180 & 181	340 & 341
102 & 103	262 & 263		182 & 183	342 & 343
104 & 105	264 & 265		184 & 185	344 & 345
106 & 107	266 & 267		186 & 187	346 & 347
108 & 109	268 & 269		188 & 189	348 & 349
110 & 111	270 & 271		190 & 191	350 & 351
112 & 113	272 & 273		192 & 193	352 & 353
114 & 115	274 & 275		194 & 195	354 & 355
116 & 117	276 & 277		196 & 197	356 & 357
118 & 119	278 & 279		198 & 199	358 & 359

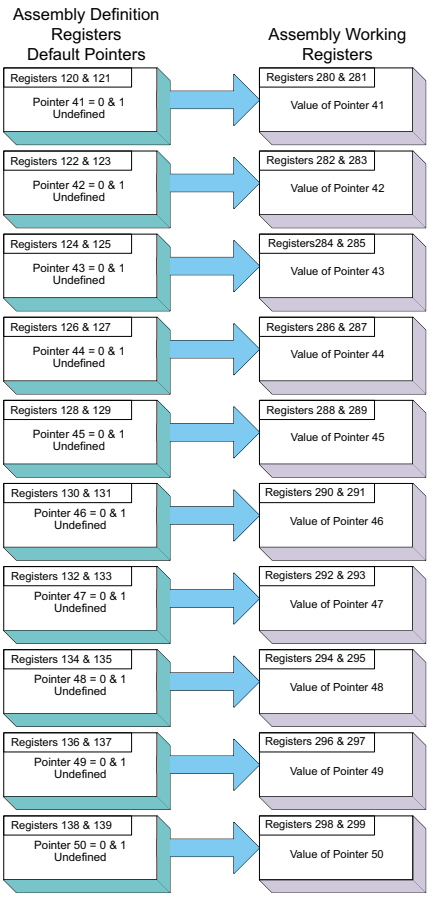
Note:

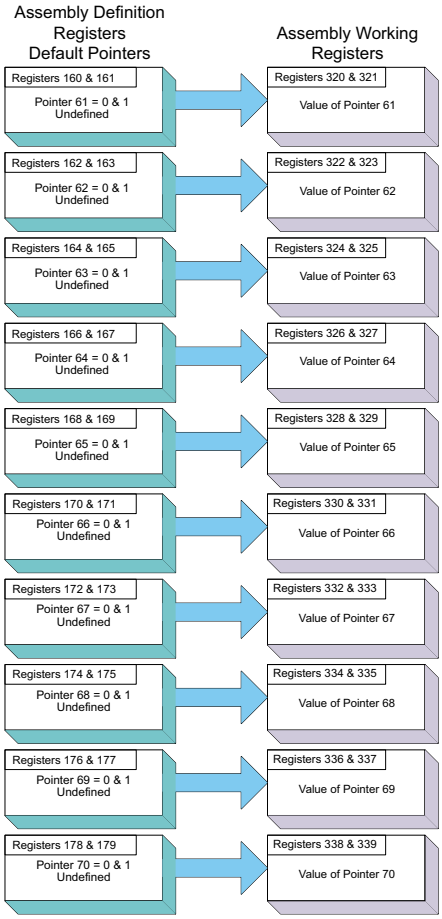
Notice that in the Modbus tables that follow the first 40 members have predefined definitions from the factory. These members reflect the assembly of the RMC module only. All other RM module assemblies are undefined as delivered from the factory; if the undefined members are to be used, they must be configured by the user

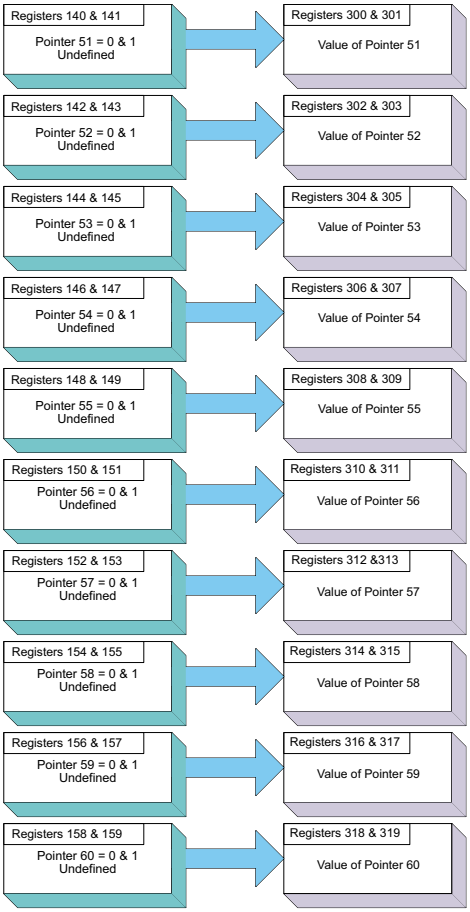
Modbus Default Assembly Structure 40-119

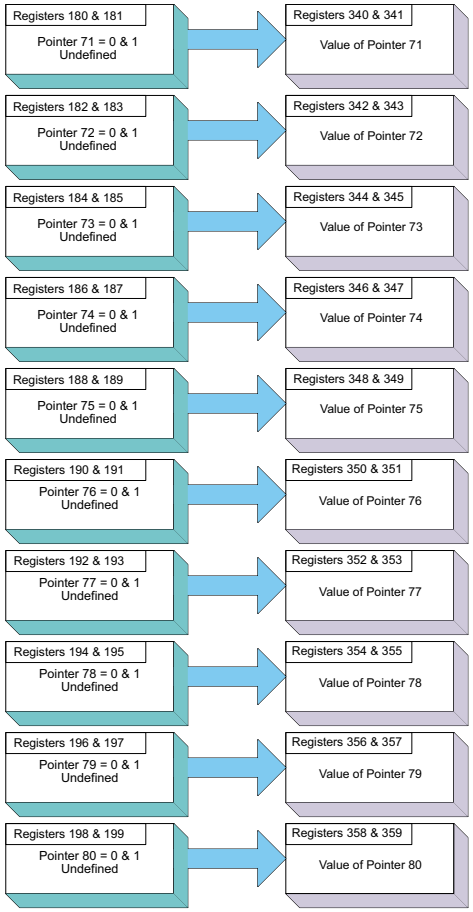


Modbus Default Assembly Structure 120-199









CIP Implicit Assembly Structure

RMA / RME CIP Implicit Assembly Defaults

CIP Implicit Assembly Originator (Master) to Target (RMA / RME)					
Assembly Members	**Assembly Class, Instance, Attritbute**	**RM Module Data Type**	**Parameter**	**Parameter Class, Instance, Attritbute**	**PLC Data Type**
1	0x77, 0x01, 0x01	DINT	None specified	0x0, 0x00, 0x00	undefined
2	0x77, 0x01, 0x02	DINT	None specified	0x0, 0x00, 0x00	undefined
3	0x77, 0x01, 0x03	DINT	None specified	0x0, 0x00, 0x00	undefined
4	0x77, 0x01, 0x04	DINT	None specified	0x0, 0x00, 0x00	undefined
5	0x77, 0x01, 0x05	DINT	None specified	0x0, 0x00, 0x00	undefined
6	0x77, 0x01, 0x06	DINT	None specified	0x0, 0x00, 0x00	undefined
7	0x77, 0x01, 0x07	DINT	None specified	0x0, 0x00, 0x00	undefined
8	0x77, 0x01, 0x08	DINT	None specified	0x0, 0x00, 0x00	undefined
9	0x77, 0x01, 0x09	DINT	None specified	0x0, 0x00, 0x00	undefined
10	0x77, 0x01, 0x0A	DINT	None specified	0x0, 0x00, 0x00	undefined
11	0x77, 0x01, 0x0B	DINT	None specified	0x0, 0x00, 0x00	undefined
12	0x77, 0x01, 0x0C	DINT	None specified	0x0, 0x00, 0x00	undefined
13	0x77, 0x01, 0x0D	DINT	None specified	0x0, 0x00, 0x00	undefined
14	0x77, 0x01, 0x0E	DINT	None specified	0x0, 0x00, 0x00	undefined
15	0x77, 0x01, 0x0F	DINT	None specified	0x0, 0x00, 0x00	undefined
16	0x77, 0x01, 0x10	DINT	None specified	0x0, 0x00, 0x00	undefined
17	0x77, 0x01, 0x11	DINT	None specified	0x0, 0x00, 0x00	undefined
18	0x77, 0x01, 0x12	DINT	None specified	0x0, 0x00, 0x00	undefined
19	0x77, 0x01, 0x13	DINT	None specified	0x0, 0x00, 0x00	undefined
20	0x77, 0x01, 0x14	DINT	None specified	0x0, 0x00, 0x00	undefined

CIP Implicit Assembly Target (RMA / RME) to Originator (Master)					
Assembly Members	**Assembly Class, Instance, Attritbute**	**RM Module Data Type**	**Parameter**	**Parameter Class, Instance, Attritbute**	**PLC Data Type**
1	Cannot be changed	Binary	Device Status	none	DINT
2	0x77, 0x02, 0x01	DINT	None specified	0x0, 0x00, 0x00	undefined
3	0x77, 0x02, 0x02	DINT	None specified	0x0, 0x00, 0x00	undefined
4	0x77, 0x02, 0x03	DINT	None specified	0x0, 0x00, 0x00	undefined
5	0x77, 0x02, 0x04	DINT	None specified	0x0, 0x00, 0x00	undefined
6	0x77, 0x02, 0x05	DINT	None specified	0x0, 0x00, 0x00	undefined
7	0x77, 0x02, 0x06	DINT	None specified	0x0, 0x00, 0x00	undefined
8	0x77, 0x02, 0x07	DINT	None specified	0x0, 0x00, 0x00	undefined
9	0x77, 0x02, 0x08	DINT	None specified	0x0, 0x00, 0x00	undefined
10	0x77, 0x02, 0x09	DINT	None specified	0x0, 0x00, 0x00	undefined
11	0x77, 0x02, 0x0A	DINT	None specified	0x0, 0x00, 0x00	undefined
12	0x77, 0x02, 0x0B	DINT	None specified	0x0, 0x00, 0x00	undefined
13	0x77, 0x02, 0x0C	DINT	None specified	0x0, 0x00, 0x00	undefined
14	0x77, 0x02, 0x0D	DINT	None specified	0x0, 0x00, 0x00	undefined
15	0x77, 0x02, 0x0E	DINT	None specified	0x0, 0x00, 0x00	undefined
16	0x77, 0x02, 0x0F	DINT	None specified	0x0, 0x00, 0x00	undefined
17	0x77, 0x02, 0x10	DINT	None specified	0x0, 0x00, 0x00	undefined
18	0x77, 0x02, 0x11	DINT	None specified	0x0, 0x00, 0x00	undefined
19	0x77, 0x02, 0x12	DINT	None specified	0x0, 0x00, 0x00	undefined
20	0x77, 0x02, 0x13	DINT	None specified	0x0, 0x00, 0x00	undefined
21	0x77, 0x02, 0x14	DINT	None specified	0x0, 0x00, 0x00	undefined

RMH / RMS / RML CIP Implicit O to T Assembly Defaults

CIP Implicit Assembly Originator (Master) to Target (RMH / RMS / RML)					
Assembly Members	**Assembly Class, Instance, Attritbute**	**RM Module Data Type**	**Parameter**	**Parameter Class, Instance, Attritbute**	**PLC Data Type**
1	0x77, 0x01, 0x01	DINT	None specified	0x01, 0x01, 0x00	undefined
2	0x77, 0x01, 0x02	DINT	None specified	0x0, 0x00, 0x00	undefined
3	0x77, 0x01, 0x03	DINT	None specified	0x0, 0x00, 0x00	undefined
4	0x77, 0x01, 0x04	DINT	None specified	0x0, 0x00, 0x00	undefined
5	0x77, 0x01, 0x05	DINT	None specified	0x0, 0x00, 0x00	undefined
6	0x77, 0x01, 0x06	DINT	None specified	0x0, 0x00, 0x00	undefined
7	0x77, 0x01, 0x07	DINT	None specified	0x0, 0x00, 0x00	undefined
8	0x77, 0x01, 0x08	DINT	None specified	0x0, 0x00, 0x00	undefined
9	0x77, 0x01, 0x09	DINT	None specified	0x0, 0x00, 0x00	undefined
10	0x77, 0x01, 0x0A	DINT	None specified	0x0, 0x00, 0x00	undefined
11	0x77, 0x01, 0x0B	DINT	None specified	0x0, 0x00, 0x00	undefined
12	0x77, 0x01, 0x0C	DINT	None specified	0x0, 0x00, 0x00	undefined
13	0x77, 0x01, 0x0D	DINT	None specified	0x0, 0x00, 0x00	undefined
14	0x77, 0x01, 0x0E	DINT	None specified	0x0, 0x00, 0x00	undefined
15	0x77, 0x01, 0x0F	DINT	None specified	0x0, 0x00, 0x00	undefined
16	0x77, 0x01, 0x10	DINT	None specified	0x0, 0x00, 0x00	undefined
17	0x77, 0x01, 0x11	DINT	None specified	0x0, 0x00, 0x00	undefined
18	0x77, 0x01, 0x12	DINT	None specified	0x0, 0x00, 0x00	undefined
19	0x77, 0x01, 0x13	DINT	None specified	0x0, 0x00, 0x00	undefined
20	0x77, 0x01, 0x14	DINT	None specified	0x0, 0x00, 0x00	undefined
21	0x77, 0x01, 0x15	DINT	None specified	0x0, 0x00, 0x00	undefined
22	0x77, 0x01, 0x16	DINT	None specified	0x0, 0x00, 0x00	undefined
23	0x77, 0x01, 0x17	DINT	None specified	0x0, 0x00, 0x00	undefined
24	0x77, 0x01, 0x18	DINT	None specified	0x0, 0x00, 0x00	undefined
25	0x77, 0x01, 0x19	DINT	None specified	0x0, 0x00, 0x00	undefined
26	0x77, 0x01, 0x1A	DINT	None specified	0x0, 0x00, 0x00	undefined
27	0x77, 0x01, 0x1B	DINT	None specified	0x0, 0x00, 0x00	undefined
28	0x77, 0x01, 0x1C	DINT	None specified	0x0, 0x00, 0x00	undefined
29	0x77, 0x01, 0x1D	DINT	None specified	0x0, 0x00, 0x00	undefined
30	0x77, 0x01, 0x1E	DINT	None specified	0x0, 0x00, 0x00	undefined
31	0x77, 0x01, 0x1F	DINT	None specified	0x0, 0x00, 0x00	undefined
32	0x77, 0x01, 0x20	DINT	None specified	0x0, 0x00, 0x00	undefined
33	0x77, 0x01, 0x21	DINT	None specified	0x0, 0x00, 0x00	undefined
34	0x77, 0x01, 0x22	DINT	None specified	0x0, 0x00, 0x00	undefined
35	0x77, 0x01, 0x23	DINT	None specified	0x0, 0x00, 0x00	undefined
36	0x77, 0x01, 0x24	DINT	None specified	0x0, 0x00, 0x00	undefined
37	0x77, 0x01, 0x25	DINT	None specified	0x0, 0x00, 0x00	undefined
38	0x77, 0x01, 0x26	DINT	None specified	0x0, 0x00, 0x00	undefined
39	0x77, 0x01, 0x27	DINT	None specified	0x0, 0x00, 0x00	undefined
40	0x77, 0x01, 0x28	DINT	None specified	0x0, 0x00, 0x00	undefined

RMH / RMS / RML CIP Implicit T to O Assembly Defaults

CIP Implicit Assembly Target (RMH / RMS / RML) to Originator (Master)					
Assembly Members	**Assembly Class, Instance, Attritbute**	**RM Module Data Type**	**Parameter**	**Parameter Class, Instance, Attritbute**	**PLC Data Type**
1	Cannot be changed	Binary	Device Status	none	DINT
2	0x77, 0x02, 0x01	DINT	None specified	0x0, 0x00, 0x00	undefined
3	0x77, 0x02, 0x02	DINT	None specified	0x0, 0x00, 0x00	undefined
4	0x77, 0x02, 0x03	DINT	None specified	0x0, 0x00, 0x00	undefined
5	0x77, 0x02, 0x04	DINT	None specified	0x0, 0x00, 0x00	undefined
6	0x77, 0x02, 0x05	DINT	None specified	0x0, 0x00, 0x00	undefined
7	0x77, 0x02, 0x06	DINT	None specified	0x0, 0x00, 0x00	undefined
8	0x77, 0x02, 0x07	DINT	None specified	0x0, 0x00, 0x00	undefined
9	0x77, 0x02, 0x08	DINT	None specified	0x0, 0x00, 0x00	undefined
10	0x77, 0x02, 0x09	DINT	None specified	0x0, 0x00, 0x00	undefined
11	0x77, 0x02, 0x0A	DINT	None specified	0x0, 0x00, 0x00	undefined
12	0x77, 0x02, 0x0B	DINT	None specified	0x0, 0x00, 0x00	undefined
13	0x77, 0x02, 0x0C	DINT	None specified	0x0, 0x00, 0x00	undefined
14	0x77, 0x02, 0x0D	DINT	None specified	0x0, 0x00, 0x00	undefined
15	0x77, 0x02, 0x0E	DINT	None specified	0x0, 0x00, 0x00	undefined
16	0x77, 0x02, 0x0F	DINT	None specified	0x0, 0x00, 0x00	undefined
17	0x77, 0x02, 0x10	DINT	None specified	0x0, 0x00, 0x00	undefined
18	0x77, 0x02, 0x11	DINT	None specified	0x0, 0x00, 0x00	undefined
19	0x77, 0x02, 0x12	DINT	None specified	0x0, 0x00, 0x00	undefined
20	0x77, 0x02, 0x13	DINT	None specified	0x0, 0x00, 0x00	undefined
21	0x77, 0x02, 0x14	DINT	None specified	0x0, 0x00, 0x00	undefined
22	0x77, 0x02, 0x15	DINT	None specified	0x0, 0x00, 0x00	undefined
23	0x77, 0x02, 0x16	DINT	None specified	0x0, 0x00, 0x00	undefined
24	0x77, 0x02, 0x17	DINT	None specified	0x0, 0x00, 0x00	undefined
25	0x77, 0x02, 0x18	DINT	None specified	0x0, 0x00, 0x00	undefined
26	0x77, 0x02, 0x19	DINT	None specified	0x0, 0x00, 0x00	undefined
27	0x77, 0x02, 0x1A	DINT	None specified	0x0, 0x00, 0x00	undefined
28	0x77, 0x02, 0x1B	DINT	None specified	0x0, 0x00, 0x00	undefined
29	0x77, 0x02, 0x1C	DINT	None specified	0x0, 0x00, 0x00	undefined
30	0x77, 0x02, 0x1D	DINT	None specified	0x0, 0x00, 0x00	undefined
31	0x77, 0x02, 0x1E	DINT	None specified	0x0, 0x00, 0x00	undefined
32	0x77, 0x02, 0x1F	DINT	None specified	0x0, 0x00, 0x00	undefined
33	0x77, 0x02, 0x20	DINT	None specified	0x0, 0x00, 0x00	undefined
34	0x77, 0x02, 0x21	DINT	None specified	0x0, 0x00, 0x00	undefined
35	0x77, 0x02, 0x22	DINT	None specified	0x0, 0x00, 0x00	undefined
36	0x77, 0x02, 0x23	DINT	None specified	0x0, 0x00, 0x00	undefined
37	0x77, 0x02, 0x24	DINT	None specified	0x0, 0x00, 0x00	undefined
38	0x77, 0x02, 0x25	DINT	None specified	0x0, 0x00, 0x00	undefined
39	0x77, 0x02, 0x26	DINT	None specified	0x0, 0x00, 0x00	undefined
40	0x77, 0x02, 0x27	DINT	None specified	0x0, 0x00, 0x00	undefined
41	0x77, 0x02, 0x28	DINT	None specified	0x0, 0x00, 0x00	undefined

RMC CIP Implicit Assembly Defaults

CIP Implicit Assembly Originator (Master) to Target (RMC)					
Assembly Members	**Assembly Class, Instance, Attritbute**	**RM Module Data Type**	**Parameter**	**Parameter Class, Instance, Attritbute**	**PLC Data Type**
1	0x77, 0x01, 0x01	DINT	Control Loop 1, Closed Loop Set Point	0x6B, 0x01, 0x01	REAL
2	0x77, 0x01, 0x02	DINT	Control Loop 2, Closed Loop Set Point	0x6B, 0x02, 0x01	REAL
3	0x77, 0x01, 0x03	DINT	Control Loop 3, Closed Loop Set Point	0x6B, 0x03, 0x01	REAL
4	0x77, 0x01, 0x04	DINT	Control Loop 4, Closed Loop Set Point	0x6B, 0x04, 0x01	REAL
5	0x77, 0x01, 0x05	DINT	Control Loop 1, Open Loop Set Point	0x6B, 0x01, 0x02	REAL
6	0x77, 0x01, 0x06	DINT	Control Loop 2, Open Loop Set Point	0x6B, 0x02, 0x02	REAL
7	0x77, 0x01, 0x07	DINT	Control Loop 3, Open Loop Set Point	0x6B, 0x03, 0x02	REAL
8	0x77, 0x01, 0x08	DINT	Control Loop 4, Open Loop Set Point	0x6B, 0x04, 0x02	REAL
9	0x77, 0x01, 0x09	DINT	Control Loop 1, User Control Mode	0x97, 0x01, 0x02	DINT
10	0x77, 0x01, 0x0A	DINT	Control Loop 2, User Control Mode	0x97, 0x02, 0x02	DINT
11	0x77, 0x01, 0x0B	DINT	Control Loop 3, User Control Mode	0x97, 0x03, 0x02	DINT
12	0x77, 0x01, 0x0C	DINT	Control Loop 4, User Control Mode	0x97, 0x04, 0x02	DINT
13	0x77, 0x01, 0x0D	DINT	Alarm 1, Alarm High Set Point	0x6D, 0x01, 0x01	REAL
14	0x77, 0x01, 0x0E	DINT	Alarm 2, Alarm High Set Point	0x6D, 0x02, 0x01	REAL
15	0x77, 0x01, 0x0F	DINT	Alarm 3, Alarm High Set Point	0x6D, 0x03, 0x01	REAL
16	0x77, 0x01, 0x10	DINT	Alarm 4, Alarm High Set Point	0x6D, 0x04, 0x01	REAL
17	0x77, 0x01, 0x11	DINT	Alarm 1, Alarm Low Set Point	0x6D, 0x05, 0x01	REAL
18	0x77, 0x01, 0x12	DINT	Alarm 2, Alarm Low Set Point	0x6D, 0x06, 0x01	REAL
19	0x77, 0x01, 0x13	DINT	Alarm 3, Alarm Low Set Point	0x6D, 0x07, 0x01	REAL
20	0x77, 0x01, 0x14	DINT	Alarm 4, Alarm Low Set Point	0x6D, 0x08, 0x01	REAL

CIP Implicit Assembly Target (RMC) to Originator (Master)					
Assembly Members	**Assembly Class, Instance, Attritbute**	**RM Module Data Type**	**Parameter**	**Parameter Class, Instance, Attritbute**	**PLC Data Type**
1	Cannot be changed	Binary	Device Status	none	DINT
2	0x77, 0x02, 0x01	DINT	Analog Input 1, Analog Input Value (filtered)	0x68, 0x01, 0x01	REAL
3	0x77, 0x02, 0x02	DINT	Analog Input 1, Input Error	0x68, 0x01, 0x02	DINT
4	0x77, 0x02, 0x03	DINT	Analog Input 2, Analog Input Value (filtered)	0x68, 0x02, 0x01	REAL
5	0x77, 0x02, 0x04	DINT	Analog Input 2, Input Error	0x68, 0x02, 0x02	DINT
6	0x77, 0x02, 0x05	DINT	Analog Input 3, Analog Input Value (filtered)	0x68, 0x03, 0x01	REAL
7	0x77, 0x02, 0x06	DINT	Analog Input 3, Input Error	0x68, 0x03, 0x02	DINT
8	0x77, 0x02, 0x07	DINT	Analog Input 4, Analog Input Value (filtered)	0x68, 0x04, 0x01	REAL
9	0x77, 0x02, 0x08	DINT	Analog Input 4, Input Error	0x68, 0x04, 0x02	DINT
10	0x77, 0x02, 0x09	DINT	Alarm 1, Alarm State	0x6D, 0x01, 0x09	DINT
11	0x77, 0x02, 0x0A	DINT	Alarm 2, Alarm State	0x6D, 0x02, 0x09	DINT
12	0x77, 0x02, 0x0B	DINT	Alarm 3, Alarm State	0x6D, 0x03, 0x09	DINT
13	0x77, 0x02, 0x0C	DINT	Alarm 4, Alarm State	0x6D, 0x04, 0x09	DINT
14	0x77, 0x02, 0x0D	DINT	Alarm 5, Alarm State	0x6D, 0x05, 0x09	DINT
15	0x77, 0x02, 0x0E	DINT	Alarm 6, Alarm State	0x6D, 0x06, 0x09	DINT
16	0x77, 0x02, 0x0F	DINT	Alarm 7, Alarm State	0x6D, 0x07, 0x09	DINT
17	0x77, 0x02, 0x10	DINT	Alarm 8, Alarm State	0x6D, 0x08, 0x09	DINT
18	0x77, 0x02, 0x11	DINT	Control Loop 1, Output Power	0x97, 0x01, 0x0F	REAL
19	0x77, 0x02, 0x12	DINT	Control Loop 2, Output Power	0x97, 0x02, 0x0F	REAL
20	0x77, 0x02, 0x13	DINT	Control Loop 3, Output Power	0x97, 0x03, 0x0F	REAL
21	0x77, 0x02, 0x14	DINT	Control Loop 4, Output Power	0x97, 0x04, 0x0F	REAL

As can be seen on the previous page the RMC module is the only RM module that defaults to a populated assembly structure. If it is desired to use the implicit assembly for any of the other RM modules the assembly structure must be built by the user. Their are many software tools available to modify the assembly structure and it is outside of the scope of this document to describe how to use those. What can be found in this document is the *process* to build the assembly structure. If viewing this document electronically simply click on the link below to read the section entitled " Modifying Implicit Assembly Members". Otherwise, turn back to the table of contents to find the above named section.

Compact Class Assembly Structure

On the next four pages the 18 available members of the Compact Class are displayed. While looking at these illustrations keep in mind that each member of the implicit assembly is 32-bits in length. To better illustrate this information, each member was divided in half where the most significant 16-bit words are identified as MSW A and MSW B (see page headers) and the least significant words are identified as the LSW A and LSW B. In the event that these pages are printed out and then mixed up, simply match up (left to right) the pages MSW A and LSW A. Likewise, match up MSW B to LSW B.

For further explanation as to what the Compact Class assembly is, navigate to the RMA Communications Chapter and then to the section entitled "Compact Implicit Assembly Class"

Compact Class MSW A

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Control Loop T2O	(C) 0x71 (113) (I) 1 to 24 (A) 1	RMH	Filtered Analog Input Value (instance i)															
			Bits 16 to 31, Signed 16 bits with implied tenths precision (-3276.8 to 3276.7)															

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Analog Input T2O	(C) 0x71 (113) (I) 1 to 24 (A) 0x0F (15)	RMH RML RMS	Input error status	Filtered Analog Input Value (instance i + 1)														
				Bits 16 to 30, Signed 15 bits with implied tenths precision (-1638.4 to 1638.3)														
								Bit 31, Analog Input Error Status (0 = None, 1 = Error)										

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Analog Input T2O	(C) 0x71 (113) (I) 1 to 24 (A) 0x10 (16)	RMH RML RMS	Filtered Analog Input Value (instance i + 1)															
			Bit16 to 31, Signed 16 bits with implied tenths precision (-3276.8 to 3276.7)															

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Analog Input T2O	(C) 0x71 (113) (I) 1 to 24 (A) 0x11 (17)	RMH RML RMS	Spare	Input error status	Spare	Input error status	Spare	Input error status	Spare	Input error status	Spare	Input error status	Spare	Input error status	Spare	Input error status	Spare	Input error status
					Bits 16, 18, 20, 22, 24, 26, 28 and 30, Reflect the Analog Input Error Status for instance i to instance i + 15 respectively (0 = None, 1 = Error)													

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Limit Loop T2O	(C) 0x71 (113) (I) 1 to 24 (A) 6	RML	Limit state		Input error status	Analog Input Value (instance i + 1)												
									Bits 16 to 28, Signed 13 bits, whole (-4096 to 4095)									
								Bit 29, Analog Input Error Status (0 = None, 1 = Error)										
							Bits 30 to 31, Limit State (00 = None, 01 = Limit Low, 10 = Limit High, 11 = Other)										

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Limit Loop T2O	(C) 0x71 (113) (I) 1 to 24 (A) 9	RML	Limit state		Limit state		Limit state		Limit state		Limit state		Limit state		Limit state		Limit state	
						Bits 16 to 31, This member has paired bits which represent the state of up to 16 limit (00 = None, 01 = Limit Low, 10 = Limit High,											

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Alarm T2O	(C) 0x71 (113) (I) 1 to 24 (A) 0x0C (12)	RMH RML RMS	Alarm state		Alarm state		Alarm state		Alarm state		Alarm state		Alarm state		Alarm state		Alarm state	
						Bits 16 to 31, This member has paired bits which represent the state of up to 16 alarms (00 = None, 01 = Alarm Low, 10 = Alarm High, 11 = Other)											

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Control Loop O2T	(C) 0x71 (113) (I) 1 to 24 (A) 2	RMH	Closed Loop Set Point (instance i)															
			Bits 16 to 31, Signed 16 bits with implied tenths precision (-3276.8 to 3276.7)															

Compact Class LSW A

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input error status	Loop error status	Actual CM		Tune status	Control Loop Output Power (instance i)										

Bits 0 to 10, Signed 10 bits with implied tenths precision (-100.0 to 100.0)
Bit 11, Loop Tuning Status (0 = Off, 1 = Error)
Bits 12 and 13, Actual Control Mode (00 = Off, 01 = Manual, 10 = Auto)
Bit 14, Loop Error Status (0 = None, 1 = Error)
Bit 15, Analog Input Error Status (0 = None, 1 = Error)

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input error status	Filtered Analog Input Value (instance i)														

Bits 0 to 14, Signed 15 bits with implied tenths precision (-1638.4 to 1638.3)
Bit 15, Analog Input Error Status (0 = None, 1 = Error)

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Filtered Analog Input Value (instance i)															

Bits 0 to 15, Signed 16 bits with implied tenths precision (-3276.8 to 3276.7)

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Spare	Input error status	Spare	Input error status	Spare	Input error status	Spare	Input error status	Spare	Input error status	Spare	Input error status	Spare	Input error status	Spare	Input error status

Bits 0, 2, 4, 6, 8, 10, 12 and 14, Reflect the Analog Input Error Status for instance i to instance i + 15 respectively (0 = None, 1 = Error)

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Limit state		Input error status	Analog Input Value (instance i)												

Bits 0 to 12, Signed 13 bits, whole (-4096 to 4095)
Bits 13 and 29, Analog Input Error Status (0 = None, 1 = Error)
Bits 14 to 15, Limit State (00 = None, 01 = Limit Low, 10 = Limit High, 11 = Other)

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Limit state		Limit state		Limit state		Limit state		Limit state		Limit state		Limit state		Limit state	

Bits 0 to 15, This member has paired bits which represent the state of up to 16 limit (00 = None, 01 = Limit Low, 10 = Limit High,

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Alarm state		Alarm state		Alarm state		Alarm state		Alarm state		Alarm state		Alarm state		Alarm state	

Bits 0 to 15, This member has paired bits which represent the state of up to 16 alarms (00 = None, 01 = Alarm Low, 10 = Alarm High, 11 = Other)

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
spare	Open loop clear	Control Mode		Initiate tune	Open Loop Set Point (instance i)										

Bits 0 to 10, Signed 10 bits with implied tenths precision (-100.0 to 100.0)
Bit 12 and 13, Control Mode (00 = Off, 01 = Manual, 10 = Auto)
Bit 14, Clear an Open loop Condition (0 = Ignore, 1 = Clear)

Compact Class MSW B

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Control Loop O2T	(C) 0x71 (113) (I) 1 to 24 (A) 3	RMH	Closed Loop Set Point (instance i +1)															
			Bits 16 to 31, Signed 16 bits with implied tenths precision (-3276.8 to 3276.7)															

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Control Loop O2T	(C) 0x71 (113) (I) 1 to 24 (A) 4	RMH	Heat Proportional Band (instance i)															
			Bits 16 to 31, Unsigned 16 bits with implied tenths precision (0 to 6553.5)															

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Control Loop O2T	(C) 0x71 (113) (I) 1 to 24 (A) 5	RMH	Cool Proportional Band (instance i)															
			Bits 16 to 31, Unsigned 16 bits with implied tenths precision (0 to 6553.5)															

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Limt Loop O2T	(C) 0x71 (113) (I) 1 to 24 (A) 0x0A (10)	RML	spare	Limit clear	Clear latched error	Limit Set Point High (instance i)												
			Bits 16 to 28, Signed 13 bits whole (-4096 to 4095)															
			Bit 29, Clear Latched Input Error (0 = Ignore, 1 = Clear)															
			Bit 30, Clear Latched Error (0 = Ignore, 1 = Clear)															

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Limit Loop O2T	(C) 0x71 (113) (I) 1 to 24 (A) 7	RML	spare	Limit clear	Clear latched error	Limit Set Point High (instance i + 1)												
			Bits 16 to 28, Signed 13 bits whole (-4096 to 4095)															
			Bit 29, Clear Latched Input Error (0 = Ignore, 1 = Clear)															
			Bit 30, Clear Latched Error (0 = Ignore, 1 = Clear)															

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Limt Loop O2T	(C) 0x71 (113) (I) 1 to 24 (A) 9	RML	spare	Limit clear	spare	Limit clear	spare	Limit clear	spare	Limit clear	spare	Limit clear	spare	Limit clear	spare	Limit clear	spare	Limit clear
			Bits 16, 18, 20, 22, 24, 26, 28 and 30, Limit Clear for instance i to instance i + 15 respectively (0 = Ignore, 1 = Clear)															

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Alarm O2T	(C) 0x71 (113) (I) 1 to 24 (A) 0x0D (13)	RMH RML RMS	Alarm clear	Alarm silence	Alarm clear	Alarm silence	Alarm clear	Alarm silence	Alarm clear	Alarm silence	Alarm clear	Alarm silence	Alarm clear	Alarm silence	Alarm clear	Alarm silence	Alarm clear	Alarm silence
			Bits 16, 18, 20, 22, 24, 26, 28 and 30, Alarm Silence for instance i to instance i + 15 respectively (0 = Ignore, 1 = Clear)															
			Bits 17, 19, 21, 23, 25, 27, 29 and 31, Alarm Clear for instance i to instance i + 15 respectively (0 = Ignore, 1 = Silence)															

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Alarm O2T	(C) 0x71 (113) (I) 1 to 24 (A) 0x0E (14)	RMH RML RMS	Alarm clear	Alarm Set Point High (instance i)														
			Bits 16 to 30, Signed 15 bits with implied tenths precision (-1638.4 to 1638.3)															
			Bit 31, Alarm Clear (0 = Ignore, 1 = Clear)															

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Variable O2T	(C) 0x71 (113) (I) 1 to 24 (A) 0x12 (18)	RMH RML RMS	Analog Value															
			Bits 16 to 31, Signed 16 bits with implied tenths precision (-3276.8 to 3276.7)															

Assembly	Class, Instance, Attribute	Module Availabilty	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Variable O2T	(C) 0x71 (113) (I) 1 to 24 (A) 0x13 (19)	RMH RML RMS	Digital State		Digital State		Digital State		Digital State		Digital State		Digital State		Digital State		Digital State	
			Bits 16 to 31, This member has paired bits which represent the digital state of up to 8 Variables instance i to instance i + 15 respectively (00 = Off, 01 = On)															

Compact Class LSW B

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Closed Loop Set Point (instance i)															
Bits 0 to 15, Signed 16 bits with implied tenths precision (-3276.8 to 3276.7)															

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Integral Time (instance i)															
Bits 0 to 15, Unsigned 16 bits whole (0 to 6553.5)															

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Derivative Time (instance i)															
Bits 0 to 15, Unsigned 16 bits whole (0 to 6553.5)															

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
spare			Limit Set Point Low (instance i)												
			Bits 0 to 12, Signed 13 bits whole (-4096 to 4095)												

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
spare	Limit clear	Clear latched error	Limit Set Point High (instance i)												
			Bits 0 to 12, Signed 13 bits whole (-4096 to 4095)												
			Bits 13, Clear Latched Input Error (0 = Ignore, 1 = Clear)												
			Bits 14, Clear Latched Error (0 = Ignore, 1 = Clear)												

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
spare	Limit clear	spare	Limit clear	spare	Limit clear	spare	Limit clear	spare	Limit clear	spare	Limit clear	spare	Limit clear	spare	Limit clear
			Bits 0, 2, 4, 6, 8, 10, 12, and 14, Limit Clear for instance i to instance i + 15 respectively (0 = Ignore, 1 = Clear)												

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Alarm clear	Alarm silence	Alarm clear	Alarm silence	Alarm clear	Alarm silence	Alarm clear	Alarm silence	Alarm clear	Alarm silence	Alarm clear	Alarm silence	Alarm clear	Alarm silence	Alarm clear	Alarm silence
			Bits 0, 2, 4, 6, 8, 10, 12, and 14, Alarm Silence for instance i to instance i + 15 respectively (0 = Ignore, 1 = Clear)												
			Bits 1, 3, 5, 7, 9, 11, 13 and 15, Alarm Clear for instance i to instance i + 15 respectively (0 = Ignore, 1 = Silence)												

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Alarm silence	Alarm Set Point Low (instance i)														
	Bits 0 to 14, Signed 15 bits with implied tenths precision (-1638.4 to 1638.3)														
	Bit 15, Alarm Silence (0 = Ignore, 1 = Silence)														

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Analog Value															
Bits 0 to 15, Signed 16 bits with implied tenths precision (-3276.8 to 3276.7)															

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Digital State		Digital State		Digital State		Digital State		Digital State		Digital State		Digital State		Digital State	
Bits 0 to 15, This member has paired bits which represent the digital state of up to 8 Variables instance i to instance i + 15 respectively (00 = Off, 01 = On)															

RMA Specifications

Line Voltage/Power

- 20.4 to 30.8V≂ (ac/dc), 50/60Hz, ±5 percent
- Any external power supply used should comply with a class 2 or SELV rating. (See specific module specification listing for maximum VA power consumption)
- Data retention upon power failure via nonvolatile memory
- Compliant with Semi F47-0200, Figure R1-1 voltage sag requirements
- Power consumption: 4 W, 9VA

Environment

- 0 to 149°F (-18 to 65°C) operating temperature
- -40 to 185°F (-40 to 85°C) storage temperature
- 0 to 90 percent RH, non-condensing
- Rail Mount modules are considered to be open type equipment needing to be installed in a fire and shock protection enclosure, such as a NEMA Type 1 enclosure; unless all circuit connections are Class 2 or SELV (Safety Extra Low Voltage)

Agency Certificationss

- UL®/EN 61010 listed; c-UL C22.2 #61010
- ANSI/ISA 12.12.01-2007 Class 1, Div. 2-Group A, B, C, D Temperature code T4 (optional)
- EN 60529 IP20; RM modules
- UL® 50, Type 4X indoor use RUI EZK Series
- NEMA 4X, EN 60529 IP66; RUI EZK Series
- RoHS by design, W.E.E.E.
- FM Class 3545 on limit control versions

Serial Communications

- All modules ship with isolated standard bus protocol for configuration and communication connection to all other EZ-ZONE products

Remote User Interface (RUI)

- Optional equipment
- 1/16 DIN
- Dual 4 digit, 7-segment displays
- Keys: Advance, infinity, up, down, plus a programmable EZ-Key
- Seven-segment address LED, programmed via push-button switch
- Communications activity, 2 LEDs

Maximum System Configuration

- One RMA module plus up to 16 additional RM modules (any combination), up to 152 loops

Mounting

- DIN-rail specification EN50022, 35 x 7.5 mm (1.38 x 0.30 in.)
- Can be DIN-rail mounted or chassis mounted with customer-supplied fasteners

Wiring Termination—Touch-Safe Terminals

- Right angle and front screw type terminal blocks (slots A, B, D, E)
  - Input, power and controller output terminals, touch-safe re movable 12 to 30 AWG
- Wire strip length 7.6 mm (0.30 in.)
- Torque 0.8Nm (7.0 lb.-in.) right angle, 0.5Nm (4.51lb-in) front terminal block
- Dimensional Drawing
- Use solid or stranded copper conductors only

Connector	Dimension “A” (mm/in.)
Standard	148 (5.80)
Straight	155 (6.10)

Optional Accessories

User Interface

Basic RUI

- 1⁄16 DIN
- Dual 4 digit, 7-segment LED displays
- Keys: Advance, infinity, up, down keys, plus an EZ-KEY programmable function key
- Typical display update rate 1Hz

Power Supplies

- AC/DC Power supply converter 90-264V~ (ac) to 24V⎓ (dc) volts.
- P/N 0847-0299-0000: 31 W
- P/N 0847-0300-0000: 60 W
- P/N 0847-0301-0000: 91 W

EZ-ZONE RM Product Documentation

- User's Guide, printed hard copy, P/N 0600-0072-0000
- Watlow Support Tools CD, P/N 0601-0001-0000

Additional Communication Options:

- EIA 232/485, Modbus® RTU
- EtherNet/IP™, Modbus® TCP, 10 BASE-T/100 BASE-TX
- DeviceNet™
- Profibus DP
- USB, RM recognized as a mass storage device

USB

- USB 1.1 device
- Mini USB connector type B
- Recognized as a mass storage device/serial communications

Real Time Clock with Battery Back-up

- Accuracy (typical): +/- 30ppm at 25°C
- +30/-100ppm (-20 to 65°C)
- Battery type and typical lifetime rating: 10 years at 25°C
- Lithium battery used, recycle properly

Data Logging

- File storage on-removable micro SD card
- CSV (Common separated value) file type
- Export files via removable micro SD (Secure Digital) memory card or via USB communications port

Memory Card

- Removable micro SD physical size
- 2G SD memory card provided, accepts other storage space amounts
- -25 to +85°C ambient rating, non-volatile memory
- Information access to configuration files, ability to store module auto-configuration settings and data log files if options have been ordered

Auto-configuration File Back-up

- Integrated memory
  - Supports up to four modules and two profiles
- With micro SD memory card installed
  - Supports up to 16 modules

Note:

All module parameters are backed up in memory except for USER SET 1 and USER SET 2 parameter settings.

Note:

These specifications are subject to change without prior notice.

EZ-ZONE Rail-Mount Access Module Ordering Information

Access module requires a Class 2 or SELV power supply 20.4 to 30.8 V ~(ac) / ⎓ (dc), communication port for configuration with EZ-ZONE Configurator software.

Code Number

①② EZ-ZONE Rail Mount	③ Access Module	④ Connector Style		⑤ Future Options	⑥ Comms. Options	⑦ Ramp/Soak Functions	⑧ Sys. Conf. & Data Logging Options		⑨⑩ Future Options	⑪⑫ Additional Options
RM	A		-	A				-	AA	

④ Connector Style

A	=	Right angle screw connector (standard)
F	=	Front screw connector
S	=	Custom

⑤ Future Options

A	=	Standard

⑥ Communications Options

A	=	None
2	=	Modbus ® RTU 232/485
3	=	EtherNet/IP™, Modbus ®/TCP
5	=	DeviceNet™
6	=	Profibus DP

⑦ Ramp/Soak Functions

A	=	None
B	=	Battery backup and real time clock for profile ramp and soak

⑧ System Configuration & Data Logging Options

Order Option	USB "Device" Comms.	Limited Configuration File Back-up, Maximum 4 Modules	Unlimited Auto-Configuration File Back-up, Maximum 16 Modules	On-Board Data Logging	Mobile Data
A					
B					
Y					
D					

USB Device Configuration: USB access to configuration files (and data log files if data logging option is ordered) stored via on-board SD memory card. PC access to product via Standard Bus protocol.

Auto-Configuration Backup: Limited fixed on board memory can support backing up configuration files for a maximum of 4 modules. The unlimited option utilizes a SD memory card to enable configuration file backup for up to 16 modules. Feature can be used for cloning configuration files to multiple modules or for easy field replacement to limit downtime.

Data Logging: Data log files stored on 2G SD memory card. Data files can be exported via USB communication port transfer or removing SD card into external card reader. Watlow reserves the right to ship a larger memory amount at any point in time.

Mobile Data: Transfer configuration files (and data logging files if data logging option is ordered) via removable SD memory card.

⑨⑩ Future Options

AA	=	Standard

⑪⑫ Additional Options

Firmware, Overlays, Parameter Settings

AA	=	Standard
AB	=	Replacement connectors hardware only, for the entered model number
12	=	Class 1, Div. 2 (not available with integrated limit controller or mechanical relay options)
XX	=	Custom

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Declaration of Conformity

EZ Zone Series RM

CE

WATLOW
1241 Bundy Blvd.
Winona, MN 55987 USA

an ISO 9001 approved facility since 1996.

Declares that the following Series RM (Rail Mount) products:

Model Numbers:	**RM** followed by additional letters or numbers describing use of up to four module options of various inputs and outputs or communications.
Classification:	Temperature control, Installation Category II, Pollution degree 2
Voltage and Frequency:	SELV 24 to 28 V ac 50/60 Hz or dc
Power Consumption:	RMA models 4 Watts, any other RM model 7 Watts
Environmental Rating:	IP20

Meet the essential requirements of the following European Union Directives by using the relevant standards show below to indicate compliance.

2004/108/EC Electromagnetic Compatibility Directive

EN 61326-1	**2006**		**Electrical equipment for measurement, control and laboratory use – EMC requirements, Industrial Immunity, Class A Emissions (*Not for use in a Class B environment without additional filtering).***
EN 61000-4-2	1996	A1, A2, 2001	Electrostatic Discharge Immunity
EN 61000-4-3	2006		Radiated Field Immunity
EN 61000-4-4	2004		Electrical Fast-Transient / Burst Immunity
EN 61000-4-5	2006		Surge Immunity
EN 61000-4-6	1996	A1, A2, A3, 2005	Conducted Immunity
EN 61000-4-11	2004		Voltage Dips, Short Interruptions and Voltage Variations Immunity
EN 61000-3-2	2005		Harmonic Current Emissions
EN 61000-3-3[2]	2005		Voltage Fluctuations and Flicker
SEMI F47	2000		Specification for Semiconductor Sag Immunity Figure R1-1

[2]NOTE 1: To comply with flicker requirements cycle time may need to be up to 160 seconds if load current is at 15A, or the maximum source impedance needs to be < 0.13Ω. Control power input of RM models comply with 61000-3-3 requirements.

2006/95/EC Low-Voltage Directive

EN 61010-1	**2001**	**Safety Requirements of electrical equipment for measurement, control and laboratory use. Part 1: General requirements**

Compliant with 2002/95/EC RoHS Directive

Per 2002/96/EC W.E.E.E Directive Please Recycle Properly

Raymond D. Feller III	Winona, Minnesota, USA	March 2010
Name of Authorized Representative	Place of Issue	Date of Issue

General Manager

Raymond D. Feller III

Title of Authorized Representative Signature of Authorized Representative

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